



THE AUSTRALIAN MEAT AND LIVE-STOCK RESEARCH AND DEVELOPMENT CORPORATION

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**COLLATION OF BASIC BIOLOGICAL DATA ON BEEF CATTLE PRODUCTION  
IN NORTH AUSTRALIA**

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## TABLE OF CONTENTS

SUMMARY .....	1
1. INTRODUCTION .....	1
2. METHODOLOGY .....	1
2.1 Specification of regions .....	2
2.2 Indices of quality and quantity of information .....	3
2.3 Method of presenting collated information .....	5
2.4 Limits to interpretation .....	6
3. PRODUCTION TRAITS FOR BREEDERS' .....	7
4. PRODUCTION TRAITS FOR GROWING ANIMALS .....	12
5. DISCUSSION AND IMPLICATIONS .....	17
5.1 Distribution of cattle numbers across regions .....	17
5.2 Priorities for future collection of basic biological data .....	18
5.3 Methods for data collection .....	19
5.4 Recommendations from Workshop .....	20
6. REFERENCES .....	20
7. ACKNOWLEDGEMENTS .....	21
APPENDIX 1 - Basic Biological Data for Breeders in North Australia .....	23
A. Sources, indices and production data .....	24
B. References .....	46
APPENDIX 2 - Basic Biological Data for Growing Animals in North Australia .....	53
A. Sources, indices and production data .....	54
B. References .....	80

## SUMMARY

Basic biological data on growth, reproduction and mortality for beef herds in Queensland, Northern Territory and the northern part of Western Australia have been collated and summarised. The objectives were to identify gaps in knowledge as a basis for future research planning and to provide reliable input data for herd dynamics and simulation models. The data were available as a by-product of research projects conducted to satisfy other objectives. Data for breeders and growing animals were considered separately and north Australia was divided into 16 regions based on native pasture communities and statistical divisions. A hierarchy was used to summarise and indicate the importance of data at different levels of specificity. Firstly, a bibliography of research reports containing production data was compiled. Secondly, indices were established to rank the data sets on their quality and quantity. Thirdly, the key management practices were described and production traits for fertility, liveweight, growth and mortality were summarised by giving their range over the years recorded.

Production data from 76 research reports and 146 sites for breeders and from 139 research reports and 237 sites for growing animals were summarised. Northern and southern spear grass regions in Queensland and Darwin/Gulf region in Northern Territory had the most production data for breeders. On the other hand there was virtually no relevant information on breeders for mulga, mitchell grass downs and peninsula regions of Queensland, Alice Springs region of Northern Territory and Pilbara region of Western Australia. Fertility data were quoted in virtually all studies (142/146), but mortality (29/146) and liveweight (56/146) were quoted much less frequently. For growing animals there were adequate production data for the high rainfall, northern and southern spear grass and brigalow regions in Queensland and Darwin/Gulf region in Northern Territory. Other regions, particularly mulga, spinifex, gulf lowlands and peninsula in Queensland, Barkly Tableland in Northern Territory and Pilbara in Western Australia, were poorly represented by relevant research reports for growing animals. Most growth studies (194/237) reported either annual average daily gain or weight at the end of 12 months grazing, while mortality rates were rarely given (7/237).

Priorities for future collection of basic biological data in different regions of north Australia were determined by assessing the quality and quantity of research information which was already available, the number of cattle in each region and the advice of scientists, advisers and producers from the Review Workshop in Townsville in November 1987. There was a clear need for more information on mortality rates in all regions given the impact that mortality has on profitability. Apart from this, current data, existing research and opportunistic producer demonstration sites provide adequate basic biological data without the need to establish new projects specifically for this purpose. The most important regions with a continuing need for a sound biological database were northern and southern spear grass, aristida/bothriochloa and gulf lowlands in Queensland. Regions with lower but still important requirements for basic data were brigalow in Queensland, Victoria River in Northern Territory and Kimberley in Western Australia.



## 1. INTRODUCTION

This report is the culmination of project DAQ.NAP M2, "Collation of basic biological data on productivity of cattle in beef herds in north Australia", which was undertaken on behalf of Australian Meat and Livestock Research and Development Corporation during 1987/88. The definition of basic biological data refers to growth and fertility parameters measured on the grazing animal rather than from pen feeding or laboratory situations (See Section 2.4). The methodology and findings were initially presented to a group of 40-50 active research/advisory workers from across north Australia at a workshop in Townsville during November 1987. As a result of further data collected from that workshop and input from participants, this report has been enhanced.

The objectives for this project were:

- (i) to collate, summarise and integrate indices of cattle production and management across regions for north Australia;
- (ii) to identify gaps in knowledge as a basis for future research planning; and
- (iii) to provide reliable input data on growth, reproduction and survival for herd dynamics and simulation models.

Information on beef cattle production traits is reported in a wide range of journals, conference proceedings and symposia. University theses, AMRC reviews and several text books give summaries and thematic overviews of this published information. However, there has not been any overall collation and summary for production traits across north Australia.

This study reports on the existence of suitable data, gives an index to indicate its quality and quantity and summarises the ranges for production traits. Details of the methodology and approach to collation are given in the next section. The relevant information on reproduction, liveweight and mortality for breeders and growth and mortality for growing animals is then summarised. The interpretation and implications of this information are discussed in the final section of the report. Two appendices give the collated information for breeders and growing animals as well as bibliographic details for the collated material.

## 2. METHODOLOGY

In order to collect, assess and summarise a large volume of complex research reports it was necessary to adopt a systematic approach guided by a set of well specified rules. In some cases conflict situations had to be resolved in a manner which was decided as reasonable rather than by clear-cut rules. A hierarchy was used to determine the value and importance of different levels of information. Firstly, the existence of suitable data was documented by compiling a reference list of research reports. Secondly, an index was established to rank the data sets on their quality and quantity. Thirdly, the most important production parameters were summarised to give the range over the years recorded.

In order to make best use of the information which has been collated, it is important to have an appreciation of the rules applied. These rules indicate how the summaries should be used and what are their strengths and weaknesses. Hence, this section of the report gives details of how the data were categorised and summarised. Indications are also given of which research reports cannot be used and why they are considered unsuitable.

## 2.1 Specification of regions

For this study north Australia was regarded as the whole of Queensland and the Northern Territory and the section of Western Australia north of 25°S latitude. This definition has been adopted to fit the region encompassed by the North Australia Program of AMLRDC. Data from tropical Australia or other definitions of "north" can be extracted easily from the lists and summaries.

North Australia was divided into 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 spear grass - coastal and inland strip from Cooktown to Marlborough
- (3) southern spear grass - 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 and have been used by other institutions for regional survey purposes.

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.

## 2.2 Indices of quality and quantity of information

As research projects are undertaken to satisfy a range of objectives, the type of data collected and its amount varied widely. Virtually none of the research reports were written specifically to present basic biological data to summarise production traits. When extracting information, allowances had to be made for the primary research purpose for which the data were collected. In some cases sufficient information could not be extracted from a report for use in the study. In other cases the subject matter or data reported were outside the scope of the study. However, in the majority of cases useful information was extracted. For these cases an index or score was established to indicate the relative value of different sources of information. The ranking was not an indication of how the work was performed but rather an indication of data collected and reported.

Since a suitable index could not be found in the literature, one was developed. This was explained to several experienced colleagues, their reactions and suggestions were discussed, a few modifications were made and then tested for the northern spear grass region. When the index performed as expected, it was retained throughout the study.

The index 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 the 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 castrate 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.

### 2.3 Method of presenting collated information

Major trends for the collated data are highlighted and summarised in Sections 3 and 4. The more detailed presentation of the collation is given in Appendices 1 and 2 which contain tables and 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 final section gives full bibliographic details of the references. 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 were specified by region and breed with separate entries for each class of animal. The regions were defined in Section 2.1. Where possible separate entries were given for Bos indicus and Bos taurus genotypes. Apart from this distinction, data and indices were bulked or meaned across breeds. The actual years over which data have been recorded were given to facilitate interpretation in terms of climatic data and, particularly, for rainfall totals and patterns.

The indices should only be interpreted in an ordinal sense and only within the context of this study. The actual number had no real meaning, but an entry with a higher index number than another site had "better" information. The fact that the entry had been included at all indicated that it presented relevant basic biological data.

The production data have been summarised in the remaining parts of the appendices, for fertility, mortality and liveweight for breeders and liveweight, growth and mortality for growing animals. An R has been appended to the index value for breeder liveweight to indicate that relationships between liveweight and fertility have been given in the original report for that study. For growth studies stocking rate was listed as hectares per animal where the information was given in the research report. 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 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 meaned 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 has been given where only the overall mean was available from the research report.

References were listed alphabetically for breeding and growth studies. The key or keys linking the tables and each reference were also given. This list documents the sources of information and allows the reader to check the information quoted, to search for more detailed information and to summarise the data in a more appropriate way for his application.

#### 2.4 Limits to interpretation

The data collated were restricted to production traits for grazing beef cattle. Information from pen feeding or laboratory situations was not included. Data from short term studies of less than a full season (6 months) did not give sufficient information to be included. Disease records, biochemical parameters, pasture attributes and carcass data were not part of the collation.

The methods used to aggregate data across groups, treatments or other factors 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. This was dismissed as cumbersome and unwieldy. 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 were 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 will require reference back to the original research report.

Several research reports which were within the scope of the study could not be included because critical information either was not included or was indecisive. The major category here was data summarised in graphs. The size and scale of these graphs were often such that only gross differences and production levels could be read. The second category was where dates of measurements or time periods were not given or indicated rather vaguely. Where grazing was discontinued or used a put-and-take system, seasonal growth could not be calculated. Information that was recorded and potentially valuable for our study was often overly summarised or omitted from research reports to satisfy editorial requirements for brevity in presentation.

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 diagnosis 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.

### 3. PRODUCTION TRAITS FOR BREEDERS

Detailed information is given in Appendix 1 of production traits for breeders. Part A contains sources, indices and production data for fertility, mortality and liveweight for each of the 16 regions of north Australia. Part B gives bibliographic details for each source of information on breeders. The most relevant issues from this collation

will be highlighted in this section and the information will be put into context.

The regional distribution and frequency of fertility, mortality and liveweight information on breeders are set out in Table 1. Northern and southern spear grass regions in Queensland and Darwin/Gulf in Northern Territory were well represented for each class of information. On the other hand there was virtually no relevant information for mulga, mitchell grass downs and peninsula regions of Queensland, Alice Springs region of Northern Territory and Pilbara region of Western Australia. Fertility data were quoted in virtually all studies (142/146), but mortality (29/146) and liveweight (56/146) were quoted much less frequently. Research reports were much more prevalent for Queensland than for the other states.

Table 2 sets out similar regional and frequency information to that given in Table 1, but is restricted to those studies having an index value greater than 15. To achieve this index value a study typically would be conducted over at least 3 years, with 50 or more breeders and with data collected at 2 or more musters per year. Regional frequencies for studies with an index greater than 15 followed the same trends as for all studies. The scarcity of information for most regions was even more apparent, as was the dominance of studies done in Queensland.

Half the research reports were for Brahman infused genotypes and the other half were for British breeds, predominantly Shorthorn. One-third came from research stations and the remaining two-thirds from commercial properties. Of the 76 research reports cited for breeders, 11 were published in the 1960's, 30 in the 1970's and 35 in the 1980's. Stocking rate information was given for only 50 studies. Bulls ran with the breeders continuously in 59 studies while details were provided for a restricted mating period in 73 studies. Details on pasture type and condition and on management aspects were generally not given, so studies could not be summarised or categorised on this basis.

The regional frequency of different measures of fertility is given in Table 3. Pregnancy rate was presented in most cases (116/142) while calving (31) and branding (32) rates were only rarely quoted. While pregnancy rate was clearly expressed as a proportion of cows mated, the denominator for the other rate variables was not always clearly indicated. For instance, calving rate could have been as a proportion of cows mated or of pregnant cows. Branding rate could have used either of these denominators or the number of cows mustered at the time of branding. Confusion on this point will reduce the value of results quoted for calving and branding rates. The adding of heifers, either pregnant or not, and removal of culled breeders further confused the interpretation. Hence, pregnancy rate was the most reliable measure of reproductive performance.

**Table 1.** Regional distribution and frequency of information on breeders

Region	Fertility	Mortality	Liveweight
1. Qld - high rainfall	3	0	2
2. Qld - northern spear grass	32	5	19
3. Qld - southern spear grass	28	7	11
4. Qld - aristida/bothriochloa	3	0	2
5. Qld - mulga	1	0	0
6. Qld - mitchell grass downs	2	0	2
7. Qld - spinifex	6	0	1
8. Qld - gulf lowlands	11	1	3
9. Qld - peninsula	0	0	0
10. Qld - brigalow	10	2	5
Queensland	96	15	45
11. NT - Darwin/Gulf	24	7	8
12. NT - Victoria River District	7	1	1
13. NT - Barkly Tableland	5	0	1
14. NT - Alice Springs	0	0	0
Northern Territory	36	8	10
15. WA - Kimberleys	8	4	1
16. WA - Pilbara	2	2	0
Western Australia	10	6	1
North Australia	142	29	56

**Table 2.** Regional distribution and frequency of information with index >15 for breeders

Region	Fertility	Mortality	Liveweight
1. Qld - high rainfall	1	0	1
2. Qld - northern spear grass	23	3	13
3. Qld - southern spear grass	16	6	9
4. Qld - aristida/bothriochloa	2	0	2
5. Qld - mulga	1	0	0
6. Qld - mitchell grass downs	2	0	1
7. Qld - spinifex	5	0	0
8. Qld - gulf lowlands	7	1	0
9. Qld - peninsula	0	0	0
10. Qld - brigalow	9	2	4
Queensland	66	12	30
11. NT - Darwin/Gulf	15	4	5
12. NT - Victoria River District	1	1	1
13. NT - Barkly Tableland	2	0	1
14. NT - Alice Springs	0	0	0
Northern Territory	18	5	7
15. WA - Kimberleys	2	1	1
16. WA - Pilbara	2	2	0
Western Australia	4	3	1
North Australia	88	20	38



**Table 3.** Regional frequency of different measures of fertility

Region	Pregnancy Rate	Calving Rate	Branding Rate	Losses PD to Branding
1. Qld - high rainfall	2	1	1	1
2. Qld - northern spear grass	31	6	3	14
3. Qld - southern spear grass	21	11	1	8
4. Qld - aristida/bothriochloa	3	0	0	2
5. Qld - mulga	1	0	1	1
6. Qld - mitchell grass downs	2	0	1	2
7. Qld - spinifex	2	0	5	1
8. Qld - gulf lowlands	8	1	7	4
9. Qld - peninsula	0	0	0	0
10. Qld - brigalow	10	6	2	5
Queensland	80	25	21	38
11. NT - Darwin/Gulf	24	1	5	12
12. NT - Victoria River District	7	0	0	2
13. NT - Barkly Tableland	5	0	0	2
14. NT - Alice Springs	0	0	0	0
Northern Territory	36	1	5	16
15. WA - Kimberleys	0	5	4	1
16. WA - Pilbara	0	0	2	0
Western Australia	0	5	6	1
North Australia	116	31	32	55

The regional frequency of losses from confirmed pregnancy to branding is also given in Table 3 indicating availability of this data for 55 studies. These data suffered from the limitations mentioned above for branding rate. In addition, allowance could not be made for loss in early pregnancy prior to confirmation of pregnancy. With these limitations a cross-section of data was available for northern and southern spear grass, gulf lowlands and brigalow in Queensland and Darwin/Gulf in Northern Territory. Data for other regions were minimal.

Pregnancy rate was given separately for lactating and non-lactating cows in 47 studies. Separate rates were given for maiden heifers in 51 studies and for lactating cows rearing their first calf in 48 studies. These separate reports recognised important physiological differences between these classes of animals. The greater detail of this information will be useful for modelling.

Of the 56 instances when liveweight information was presented, weights were given for mid-dry season (September) in 11 cases, end of dry season (November) in 20 cases and end of wet season (May) for 27 cases. Relationships between weight or condition score and pregnancy rate or relationships over time were given in 31 studies. Detailed liveweight data for breeders were available rarely. Similarly, mortality data were available only rarely.

Wherever possible the range over the years of the study for each of the production variables has been presented. Separate results for each site were given for Bos indicus and Bos taurus genotypes and for the classes of heifer, first calf cow and mature cow. Data have been aggregated across other factors of the design. No attempt has been made to summarise data across regions. Because of the dominant effect of seasons, the ranges for production variables were often very wide. Often they were so wide as to be of limited use as a summary. This emphasises the importance of the bibliographic details which allow the reader to consult the original research report and to extract for himself the information most suited to his purpose.

#### 4. PRODUCTION TRAITS FOR GROWING ANIMALS

Detailed information is given in Appendix 2 of production traits for growing animals. Part A contains sources, indices and production data for each region. Part B gives full bibliographic details for each source of information. This section highlights the most relevant points from these tables and attempts to put the information into context.

Table 4 sets out the regional distribution and frequency of information for calves, weaners and older growing animals. The high rainfall, northern and southern spear grass and brigalow regions in Queensland and Darwin/Gulf in Northern Territory were well represented in total and for each of the animal classes. Other regions, particularly mulga, spinifex, gulf lowlands and peninsula in Queensland, Barkly Tableland in Northern Territory and Pilbara in Western Australia were poorly represented by relevant research reports. Closer inspection showed the narrow geographic distribution for the northern spear grass, with the majority of the research reports coming from Swan's Lagoon, and for Darwin/Gulf, where

**Table 4.** Regional distribution and frequency of information on growing animals

Region	Calves	Weaners	Steers/Heifers	Total
1. Qld - high rainfall	4	5	18	27
2. Qld - northern spear grass	9	7	19	35
3. Qld - southern spear grass	14	21	17	52
4. Qld - aristida/bothriochloa	3	1	3	7
5. Qld - mulga	1	0	0	1
6. Qld - mitchell grass downs	0	1	6	7
7. Qld - spinifex	0	0	2	2
8. Qld - gulf lowlands	0	3	0	3
9. Qld - peninsula	1	1	2	4
10. Qld - brigalow	5	9	13	27
Queensland	37	48	80	165
11. NT - Darwin/Gulf	7	7	15	29
12. NT - Victoria River District	0	6	6	12
13. NT - Barkly Tableland	0	0	0	0
14. NT - Alice Springs	4	4	3	11
Northern Territory	11	17	24	52
15. WA - Kimberleys	3	5	11	19
16. WA - Pilbara	0	0	1	1
Western Australia	3	5	12	20
North Australia	51	70	116	237

Adelaide River was the dominant site.

Table 5 gives an alternative view of this distribution and frequency for sources having an index value greater than 15. To achieve such an index a study needed to have been done over at least 3 years with 40 or more animals. The trends here were the same as in Table 4 but the scarcity of information across regions was more clearly emphasised.

Sixty percent of the research reports used Bos indicus infused genotypes while the remaining ones used the traditional British based breeds. Of the 139 research reports cited for growth information, 10 were published in the 1960's, 57 in the 1970's and 72 in the 1980's.

Information on mortality rates for growing animals was rarely given in research reports, with only 7/237 giving specific rates. The mortality rate figures were probably omitted in many studies as no animals died. In some cases the statement was made that there were no deaths. In others, where the number of deaths was given, there was no information on total group size to allow mortality rates to be calculated. Management was often such that growing animals rarely died, particularly in designed experimental studies. Also, in such studies, group sizes were generally small and management might be atypical for that region.

Stocking rate was given for about one-third of the studies cited. Where improved pastures were grazed, details were given but, for native pasture, the details were sometimes sketchy. The type and amount of other background or management information varied between reports, so that it was not possible to summarise or categorise studies on this basis. However, the interested reader should consult the original source for information which was not given in the tables.

The frequency of reports of seasonal growth is shown in Table 6 for each region. Most studies (194/237) reported either annual average daily gain or weight at the end of 12 months grazing. A much lower proportion gave dry season (88/237) or wet season (82/237) growth rates. The majority of this information came from 5 of the 16 regions, namely, high rainfall, northern and southern spear grass and brigalow in Queensland and Darwin/Gulf in Northern Territory.

Actual production levels presented in Appendix 2 give ranges over the years when the study was conducted.

Because of the differences between years, diversity of management and applied treatments, no attempt has been made to get an average or representative figure for any of the production traits across regions. Such an average would be misleading. Individuals should extract summaries, generally after consulting the original source, to suit their particular purpose.

**Table 5.** Regional distribution and frequency of information with index >15 for growing animals

Region	Calves	Weaners	Steers/Heifers	Total
1. Qld - high rainfall	4	3	12	19
2. Qld - northern spear grass	9	5	11	25
3. Qld - southern spear grass	6	10	6	22
4. Qld - aristida/bothriochloa	2	0	1	3
5. Qld - mulga	1	0	0	1
6. Qld - mitchell grass downs	0	0	1	1
7. Qld - spinifex	0	0	0	0
8. Qld - gulf lowlands	0	0	0	0
9. Qld - peninsula	0	0	1	1
10. Qld - brigalow	3	2	2	7
Queensland	25	20	34	79
11. NT - Darwin/Gulf	5	2	6	13
12. NT - Victoria River District	0	3	5	8
13. NT - Barkly Tableland	0	0	0	0
14. NT - Alice Springs	3	3	0	6
Northern Territory	8	8	11	27
15. WA - Kimberleys	3	3	4	10
16. WA - Pilbara	0	0	1	1
Western Australia	3	3	5	11
North Australia	36	31	50	117

**Table 6.** Regional frequency of seasonal growth reports

Region	Dry Season or Nov Wt	Wet Season	Annual Gain or May Wt
1. Qld - high rainfall	9	10	21
2. Qld - northern spear grass	24	22	30
3. Qld - southern spear grass	18	14	45
4. Qld - aristida/bothriochloa	1	1	6
5. Qld - mulga	0	0	1
6. Qld - mitchell grass downs	2	2	6
7. Qld - spinifex	0	0	2
8. Qld - gulf lowlands	2	1	3
9. Qld - peninsula	1	1	4
10. Qld - brigalow	5	5	24
Queensland	62	56	142
11. NT - Darwin/Gulf	12	8	23
12. NT - Victoria River District	5	6	10
13. NT - Barkly Tableland	0	0	0
14. NT - Alice Springs	4	7	4
Northern Territory	21	21	37
15. WA - Kimberleys	5	5	15
16. WA - Pilbara	0	0	0
Western Australia	5	5	15
North Australia	88	82	194

## 5. DISCUSSION AND IMPLICATIONS

### 5.1 Distribution of cattle numbers across regions

The Australian Bureau of Statistics figures for the numbers of meat cattle at 31 March 1987 put the collated information into context. Queensland had by far the largest number of meat cattle followed by Northern Territory and the pastoral areas of Western Australia. The breakdown by statistical divisions is given in Table 7.

**Table 7.** Meat cattle numbers (m) by statistical divisions at 31 March 1987 (Source: Australian Bureau of Statistics)

<u>State</u>	<u>Statistical Division</u>	<u>Numbers (m)</u>	<u>Percentage of State</u>
Qld	Moreton and Brisbane	.260	3.0
	Wide Bay - Burnett	.755	8.7
	Darling Downs	1.039	12.0
	South-West	.809	9.3
	Fitzroy	1.591	18.4
	Central-West	.625	7.2
	Mackay	.843	9.7
	Northern	.844	9.7
	Far North	.640	7.4
	North-West	1.268	14.6
	Total	8.675	
NT	Darwin/Gulf	.258	17.9
	Victoria River	.473	32.9
	Barkly Tableland	.400	27.8
	Alice Springs	.309	21.5
	Total	1.439	
WA	Kimberley	.635	41.2
	Pilbara	.151	9.8
	Total	1.541	

The distribution of cattle numbers since 1979 showed a decline during the early 1980's from a peak in the late 1970's with a slight recovery in 1985 (Table 8). The decline in the Queensland total was larger than the population in either Northern Territory or the pastoral area of Western Australia.

**Table 8.** Meat cattle numbers (m) by States and total for North Australia Project area from 1979 to 1987 (Source: Australian Bureau of Statistics)

<u>Year</u>	<u>Qld</u>	<u>NT</u>	<u>WA (pastoral)</u>	<u>Total</u>
1979	10.462	1.785	0.947	13.194
1980	9.957	1.730	0.952	12.639
1981	9.561	1.675	0.936	12.172
1982	9.416	1.624	0.923	11.963
1983	8.981	1.547	0.862	11.390
1984	8.783	1.390	0.889	11.062
1985	9.051	1.484	0.839	11.374
1986	9.303	1.458	0.828	11.589
1987	8.675	1.439	0.853	10.967

## 5.2 Priorities for future collection of basic biological data

For Queensland there was limited similarity between the regions, based primarily on native pasture communities, and the statistical divisions of the Australian Bureau of Statistics, based on shire boundaries. The following matching gave some approximate correspondence:

2. northern spear grass	-	Northern and Mackay
3. southern spear grass	-	Fitzroy and Wide Bay-Burnett
4. aristida/bothriochloa	-	Darling Downs
5. mulga	-	South-West
6. mitchell grass downs	-	Central-West
8. gulf lowlands	-	North-West
9. peninsula	-	Far North

The high rainfall, spinifex and brigalow regions did not correspond to any particular statistical division, while the Moreton and Brisbane statistical division did not line up with the vegetation zones. Some of the above "matching" was also very tentative. The brigalow region included parts of Mackay, Fitzroy and Darling Downs statistical divisions. The aristida/bothriochloa region included parts of North-West and Fitzroy as well as most of Darling Downs statistical divisions. In spite of these limitations it was clear that northern and southern spear grass, aristida/bothriochloa, gulf lowlands and brigalow were major cattle producing regions of Queensland.

The collated research results showed good records for both breeders and growing animals in northern and southern spear grass regions. There was very limited information for the aristida/bothriochloa region. While the gulf lowlands had reasonable information for breeders, there was hardly any information on growing animals. For the brigalow region there was reasonable information but more is needed.

For the Northern Territory the regions coincided with statistical divisions. Cattle numbers have declined steadily since the peak in 1979 for all regions except the Victoria River District where numbers have remained high. Numbers were reasonably evenly distributed across the 4 regions. However, the research reports collated were very much concentrated in the Darwin/Gulf region, particularly for growing animals.



More biological information for all production traits is needed for the remaining 3 regions.

For Western Australia the regions of Kimberley and Pilbara and the statistical divisions are the same. Although some data on production traits were available for the Kimberleys, more is needed.

By considering cattle numbers and the production information collated, the following regional hierarchy of priorities for the future collection of basic biological data in north Australia is suggested.

- . The highest priority should be given to obtaining data in Queensland for the arid/bothriochloa and gulf lowland regions.
- . The second level of priority goes to the brigalow, Victoria River and Kimberley regions.
- . Although the northern and southern spear grass regions of Queensland have the most data documented on grazing animal performance, they represent the major cattle producing areas of north Australia and, as such, these regions must have continual collection of relevant research information because of the constant need to enhance productivity.

While there is a clear need for more basic biological data from all remaining regions, except perhaps Darwin/Gulf, lower priority is assigned to these regions. There is a clear need for information on mortality rates in all regions.

### 5.3 Methods for data collection

In this section a few of the key issues are introduced which need to be considered if research projects are to be established to collect basic biological data. The essential planning steps of setting objectives, selecting sites, determining measurements to be made and deciding on background management and operational procedures follow the normal research protocol. It is most important that data are collected under conditions typical of that region so that results apply to the region.

Key decisions involve selection of site and background management factors. More specific issues such as number of years, number and class of animals, number of musters per year and appropriate measurements should be discussed with a biometrician who is familiar with this type of research. These issues are discussed and general guidelines are given by Blight (1984) and O'Rourke (1986). An example of a study to generate basic biological data is given by McCosker and Eggington (1986).

Minimal conditions for collection of basic biological data would be individual identification, 3 years of data and 100 breeders or 40 growing animals with 2 musters per year. Data to collect would be lactation status, stage of pregnancy and liveweight or condition score for breeders and liveweight for growing animals. Total numbers are important to determine mortalities and for the denominator for reproductive rates. Hence, reasonable mustering efficiencies are necessary.

#### 5.4 Recommendations from Workshop

The main recommendations to come from a Workshop at Townsville in November 1987 concerning the collection of biological data were:

- (i) The booklet 'Collation of basic biological data on beef cattle production in north Australia' should be updated given the inputs from the workshop. The reviewers were then to approach AMLRDC to publish and distribute it as an occasional publication.

Other suggestions were that:

- (a) the booklet should be made into a form more suitable for data input into models or for publication in the Journal of the Australian Institute of Agricultural Science, and
  - (b) the tables should include base levels of production as well as treatment responses above that base level.
- (ii) Apart from mortalities, there was no priority to set up project work to collect basic biological data from northern Australian beef herds. This was because:
  - the time frame is too short to allow the results to impact on the 1994 target;
  - the current data could be used more fully to assist in identifying gaps in knowledge; and
  - existing research and opportunistic producer demonstration sites will add to knowledge.
- (iii) There was a clear need to collect more data on mortalities given the importance that mortalities have on overall herd profitability. The various problems and expense of collecting mortality data were recognised; for example, lack of animal control, proper identification, lack of recovery and mustering efficiency. Electronic identification and trapping may help in extensive areas. More thorough use of property records may give a better indication of mortalities.

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## **APPENDIX 1**

### **Basic Biological Data for Breeders in North Australia**

- A. Sources, indices and production data**
- B. References**

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
1. Queensland -								
1.1	Evans & Biggs 1979	Beerwah RS 26°40'S;153°02'E	Hereford	1972-77	19†	0	0	Nov-Jan
1.2	Round et al 1978	Orient, Ingham 18°40'S;146°10'E	Brahman	1973-75	15	0	15R	Dec-Jun
1.3	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, Charters Towers 20°50'S;146°25'E	Shorthorn	1967-70	17	0	0	
2.3	Donaldson 1971	Cromarty 19°25'S;147°05'E	Brahman cross	1967-68	14	0	0	all year
2.4	Donaldson 1971	80km SW Mackay	Brahman cross	1967	10	0	0	all year
2.5	Donaldson et al 1964	Cromarty 19°25'S;147°05'E	Shorthorn	1961	8	0	11	
2.6	Donaldson et al 1967	Bluff Downs, Charters Towers 19°30'S;145°30'E	Shorthorn	1960-62	17	0	14R	Mar-May
2.7	Donaldson et al 1967	Wondovale, Pentland 19°40'S;144°50'E	Hereford	1961-62	14	0	11R	Mar-Jun
2.8	Edye et al 1971	Lansdown 19°06'S;146°08'E	Droughtmaster	1964-68	16	0	16	Jan-Mar
2.9	Fordyce 1988	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1981-83	16	0	0	Jan-May
2.10	Fordyce 1988	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1984-87	18	0	0	all year

†F = fertility, M = mortality, W = weight are indices as given in the text. R indicates that

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet

**high rainfall**

84-100 70-100

helpers		61-82						249-314		
first calf	18-34									
mature	56	100	61-76							
	91	88	89-91			13-16		409-426	434-466	453-483

**northern spear grass**

helpers		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							
helpers			25-57							
cows			63-64							
	58	97	80							
helpers		88						261		261
cows			50		18					
cows			75		48					
cows			75	79	4					364-507
helpers		70-80								
first calf	48-51									
mature	68	91	63-82							
helpers		78-86								
first calf	44-64									
mature	60-78	88-89	66-80		72-89					

relationships between fertility and other measurements are given in the reference.

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
2. Queensland -								
2.11	Entwistle & Goddard 1984	Fletcherview 19°50'S;146°20'E	Bos indicus	1979-83	19	0	0	Jan-Apr
2.12	Goddard et al 1980	Lansdown 19°6'S;146°8'E	Droughtmaster	1979	10	0	9R	Jan-Apr
2.13	Hassall et al 1968	Meadowbank, Mt Garnet 18°16'S;144°58'E	Brahman cross	1962-67	22	0	21R	Feb-Mar  Sep-Oct
2.14	Holroyd 1985	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1972-82	26	0	24R	Jan-Apr
2.15	Holroyd 1985	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1974-80	21	0	19R	Jan-Apr
2.16	Holroyd 1985	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1978-83	22	0	20R	Jan-Apr
2.17	Holroyd 1987	Swan's Lagoon 20°05'S;147°14'E	Bos indicus	1971-82	29	0	0	Jan-Apr
2.18	Holroyd et al 1979	Swan's Lagoon 20°05'S;147°14'E	Shorthorn	1970-73	16	0	16	Sep-Jan
2.19	Holroyd et al 1979	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1970-73	16	0	16	Sep-Jan
2.20	Holroyd et al 1983	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1973-77	25	0	22R	Jan-Apr
2.21	Holroyd et al 1988a	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1977-80	16	18	19R	Jan-Apr
2.22	Holroyd et al 1988b	Swan's Lagoon 20°05'S;147°14'E	Droughtmaster	1977-80	21	0	18R	Jan-Apr
2.23	Lamond 1969	Wrotham Park (F) Chillagoe 16°40'S;143°50'E	Shorthorn	1964-65	14	0	0	all year



## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
northern spear grass										
first calf	19									
mature	20	87	20-86			4-10				
helpers		60-82								
first calf	27									
mature	68	90								
helpers		53								
first calf	38		40-62							
mature	10-40	47-90								
helpers		4	50-63							
mature	0-35	5-82								
helpers		88-94				12-13				286-330
first calf	77-92					10-30				371-404
mature	78	92	60-98			4-34				369-434
helpers		92				7				283
first calf	90					5				356
mature	82	93	75-92			2-29				392-418
helpers		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
cows	41-75	94				0-18	0-5			430-503
helpers						22				
first calf	28			39	37	8				
mature	41-83	92-100		38	78	11				
helpers		67-85								
first calf	23-32									
mature	40-43	80-87	66							

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
2. Queensland -								
2.24	Lamond 1969	Lansdown (G) 19°6'S;146°8'E	Brahman cross	1964	10	0	0	all year
2.25	Landsberg 1973	Trafalgar Charters Towers	Brahman cross	1966-71	19	0	0	
2.26	Loxton et al 1983	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1976-78	0	16	15	
2.27	Mackinnon et al 1987	Lansdown 19°6'S;146°8'E	Droughtmaster	1984-86	16	0	16	Jan-Apr
2.28	Plasto 1968; Plasto & Strachan 1970	Swan's Lagoon 20°05'S;147°14'E	Shorthorn	1963-66	25	21	0	5 periods
2.29	Rankine & Donaldson 1968	Meadowbank, Mt Garnet 18°16'S;144°58'E	Brahman cross	1962-67	19	0	0	Feb-Mar and Sep-Oct
2.30	Rea et al 1981	Lisgar, Gumlu 19°40'S;147°30'E	Droughtmaster	1978-80	14	0	0	
2.31	Round 1987	Lisgar, Gumlu 19°40'S;147°30'E	Droughtmaster	1980-86	21	0	0	Jan-Jul
2.32	Siebert et al 1976	Lansdown 19°6'S;146°8'E	Droughtmaster	1970-75	16	0	16	Jan-Feb
2.33	Taylor et al 1982	Kirk River, Mingela 19°55'S;146°45'E	Brahman cross	1971-73	11	15	14	Dec-Apr
2.34	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, Jamblin 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

[illegible]

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
3. Queensland -								
3.4	Bewg et al 1969	Brian Pastures 25°38'S;151°47'E	Hereford	1961-65	19	0	16R	3 periods
3.5	Coates et al 1987	Narayan RS, Mundubbera 25°41'S;150°52'E	Hereford	1972-82	29	25	24	Nov-Dec
3.6	Coates et al 1987	Narayan RS, Mundubbera 25°41'S;150°52'E	Belmont Red	1972-82	29	25	24	Nov-Dec
3.7	Donaldson et al 1967	Glenprarie, Marlborough 20°40'S;149°50'E	Brahman cross	1961	10	0	0	Apr-Jul
3.8	Donaldson et al 1967	Torilla Plains, Marlborough 22°30'S;150°10'E	Shorthorn	1961	8	0	0	all year
3.9	Frisch 1973a	Belmont, Rockhampton 23°15'S;150°25'E	Bos taurus	1960-69	0	28	17R	
3.10	Frisch 1973a	Belmont, Rockhampton 23°15'S;150°25'E	Bos indicus	1960-69	0	28	17R	
3.11	Frisch 1973b	Belmont, Rockhampton 23°15'S;150°25'E	Bos taurus	1954-69	25	29	0	Jan-Feb
3.12	Frisch 1973b	Belmont, Rockhampton 23°15'S;150°25'E	Bos indicus	1954-69	25	29	0	Jan-Feb
3.13	Lamond 1969	near Rockhampton (B)	Hereford	1964-65	16	0	0	all year
3.14	Lamond 1969	near Rockhampton (H)	Brahman cross	1964-65	14	0	0	all year
3.15	Lamond 1969	near Rockhampton (I)	Brahman cross	1964	10	0	0	all year
3.16	Lamond 1969	near Rockhampton (J)	Brahman	1964	10	0	0	all year

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
southern spear grass										
helpers		89		79						
cows			82-92	66-86						
cows			69-97	63-88	0-14	2	355			456
cows			61-85	58-85	0-6	1	380			473
helpers		68								
first calf	20									
cows	34	78	55							
helpers								302	328-355	
first calf								395	325-425	
mature						0-6	447	403-467		
helpers								362	371-406	
first calf								439	381-459	
mature						0-2	453	442-471		
helpers					8					
cows					8		3			
helpers					7					
cows					6		1			
helpers		69-83								
first calf	55-68									
mature	63-76	89-90	66-82							
cows	57-74	68-76	65-72							
helpers		50								
first calf	30									
mature	31	80	47							
helpers		50								
first calf	37									
mature	57	87	58							

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
3. Queensland -								
3.17	Lamond 1969	near Bundaberg (K)	Mixed	1964	10	0	0	all year
3.18	Lamond 1969	near Bundaberg (L)	Brahman cross	1964	9	0	0	all year
3.19	Lamond 1969	near Bundaberg (M)	Brahman cross	1964	9	0	0	all year
3.20	Lampkin & Kennedy 1965	Belmont, Rockhampton 23°15'S;150°25'E	Bos taurus	1954-59	21	0	20R	Jan-Feb
3.21	Lampkin & Kennedy 1965	Belmont, Rockhampton 23°15'S;150°25'E	Bos indicus	1957-62	21	0	20R	Jan-Feb
3.22	Mannetje & Coates 1976	Narayan RS, Mundubbera 25°41'S;150°52'E	Hereford	1972-75	16	0	0	Nov-Dec
3.23	Post 1980	Belmont, Rockhampton 23°15'S;150°25'E	Brahman cross	1978-80	11	0	0	Jan-Feb
3.24	Rowan 1985	QAC Gatton 27°40'S;152°25'E	Brahman cross	1982-84	16	0	0	
3.25	Rudder et al 1976	Mt Eugene, Jambin 24°10'S;150°25'E	Brahman cross	1970-75	24	0	21R	Oct-Feb
3.26	Rudder et al 1981	Mt Eugene, Jambin 24°10'S;150°25'E	Brahman cross		13	0	0	Oct-Feb
3.27	Rudder et al 1985	Mt Eugene, Jambin 24°10'S;150°25'E	Brahman cross	1972-83	26	0	26R	Oct-Feb
3.28	Seebeck 1973	Belmont, Rockhampton 23°15'S;150°25'E	Bos taurus	1954-59	21	0	0	Jan-Feb
3.29	Seebeck 1973	Belmont, Rockhampton 23°15'S;150°25'E	Bos indicus (F1)	1957-62	21	0	0	Jan-Feb

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet

## southern spear grass

helpers		87								
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first calf	43									
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mature	62	85	75							
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helpers		62								
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first calf	33									
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mature	44	83	54							
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helpers		64								
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first calf	23									
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mature	40	61	48							
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cows				25-81						
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cows				71-85						
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cows			93	84						
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helpers		82								
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cows	20-35	69-75		62						
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cows			93-95		85-88	8-9				
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helpers		62-87				13				
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cows			85			5				
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helpers		90				16				
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first calf	67					7				
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helpers		19-94							191-278	
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first calf	29-75								299-353	
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mature	67-93								342-456	
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				36-71						
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				69-81						
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## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
3. Queensland -								
3.30	Seebeck 1973	Belmont, Rockhampton 23°15'S;150°25'E	Bos indicus	1961-68	23	0	0	Jan-Feb
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	Bos taurus	1966-70	22	0	23	Oct-May
5. Queensland -								
5.1	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	1971-73	18	0	15R	all year
6.2	Holroyd et al 1988	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 B1		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



## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet

## southern spear grass

26-74

## aristida/bothriochloa

yearling	83	96	80-92
		39	

helpers		84-93			258-362	322-378
first calf	77-92				341-395	366-397
mature			88-92	4-9	370-434	373-421
cows			62-89	5-12	330-417	378-420

## mulga

helpers		74-91				
cows			91-93	82-91	8-24	

## mitchell grass downs

helpers		80				
first calf	80					
mature			76-87	53	28	
helpers		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		
helpers		93				
first calf	90					
mature			89-92	85	6	

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
7. Queensland -								
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°30'S;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 (A), 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	Bos taurus	1964	10	0	0	all year
8.11	Lamond 1969	Granada (E), Cloncurry 19°55'S;140°30'E	Brahman cross	1964-65	14	0	0	all year

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
<b>spinifex</b>										
cows			58							
<b>gulf lowlands</b>										
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							

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
9. Queensland -								
NO DATA AVAILABLE								
10. Queensland -								
10.1	Barr 1971	Kaluroo, Dingo 23°S; 149°E	Hereford	1964-69	22	0	0	Oct-Mar
10.2	Carroll 1984	Berrigunna, Blackwater 23°30'S; 148°45'E	Belmont Red	1979-83	22	0	0	
10.3	Coates et al 1987	Narayan, Mundubbera 25°41'S; 150°52'E	Hereford	1970-77	29	25	24	Nov-Dec
10.4	Coates et al 1987	Narayan, Mundubbera 25°41'S; 150°52'E	Belmont Red	1970-77	29	25	24	Nov-Dec
10.5	Mason et al 1985	Banana 24°30'S; 150°15'E	Brahman cross	1980-84	17	0	0	
10.6	Rudder 1986	Brigalow RS, Theodore 24°50'S; 149°45'E	Hereford	1981-85	22	0	21	Dec-Feb
10.7	Rudder 1986	Brigalow RS, Theodore 24°50'S; 149°45'E	Bos indicus	1981-85	22	0	21	Dec-Feb
10.8	Rudder & McCamley 1972	Memooloo, Comet 23°S; 148°E	Hereford	1964-70	22	0	0	Oct-Mar
10.9	Rudder et al 1980	El Rocco, Moura 24°S; 149°E	Brahman cross	1976-78	13	0	13	Oct-Mar
10.10	Silvey et al 1978	Narayan, Mundubbera 25°41'S; 150°52'E	Hereford	1969-72	16	0	0	Nov-Mar

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINEIGHT IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet

**peninsula**

NO DATA AVAILABLE

**brigalow**

heifers		69-85								
first calf	74-90									
mature	87-92		81-92							
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		24-94								
first calf	74-80									
mature	74-97									
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						

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
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
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	Ford 1975	Tortilla RS 13°05'S;131°15'E	Brahman cross	1969-73	16	0	15R	Feb-May
11.17	Kirby 1977	Beatrice Hill RS 12°33'S;131°25'E	mixed	1962-70	23	0	0	
11.18	McCosker & Eggington 1986	Mt Bunday No 1 13°15'S;131°07'E	Brahman cross	1981-84	17	14	16	Dec-May
11.19	McCosker & Eggington 1986	Mt Bunday No 2 13°15'S;131°07'E	Brahman cross	1980-84	21	18	20	Dec-May
11.20	McCosker & Eggington 1986	Mt Bunday No 3 13°15'S;131°07'E	Brahman cross	1980-84	21	18	20	Dec-May
11.21	McCosker & Eggington 1986	Mt Bunday No 4 13°15'S;131°07'E	Brahman cross	1980-84	19	16	18	Dec-May

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
Darwin/Gulf										
COWS			74							
COWS			50							
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							
helpers			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

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
11. Northern Territory -								
11.22	McCosker & Eggington 1986	Mt Bunday No 5 13°15'S; 131°07'E	Brahman cross	1982-84	15	12	14	Dec-May
11.23	McCosker & Eggington 1986	Mt Bunday No 6 13°15'S; 131°07'E	Brahman cross	1980-84	22	19	21	all year
11.24	Pearson 1978	Katherine Expt Farm	Brahman cross	1971-73	16	14	13R	4 periods
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	Hooper & Letts 1962	Cattle Crk, Wave Hill, 18°S; 132°E	Shorthorn	1961	9	0	0	Mar-May
12.6	Perkins et al 1988	Newry & Auvergne 16°S; 129°E & 15°S; 130°E	Mixed	1986	10	0	0	all year
12.7	Robertson 1988	Kidman Springs 16°07'S; 130°57'E	Droughtmaster	1981-85	28	19	21R	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 & Mitchell 1965	Rockhampton Downs 19°S; 133°E	Shorthorn	1961-62	13	0	18	all year
14. Northern Territory -								

NO DATA AVAILABLE



## FOR BREEDER FERTILITY, MORTALITY AND LIVEMEIGHT IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet

**Darwin/Gulf**

first calf	10-50						0			302-312
mature	16-68	100	23-79			6	0			318-369
first calf	8-25						0-21			275-307
mature	17-58	77-96	37-61		44-75	15-25	4-19			310-428
cows			60	50			7			

**Victoria River District**

cows			72							
cows			84			41				
cows			90							
cows			44			12				
cows	50	74	60							
cows	29	71								
helpers		55-96	70-88							
cows	76	94					7-17			304-330

**Barkly Tableland**

cows			64			61				
cows			70			16				
cows			59							
cows			82							
cows	55	78	64					404	397	419-437

**Alice Springs**

NO DATA AVAILABLE

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index			Mating Period
					F	M	W	
15. Western Australia -								
15.1	Carrick & Pratchett 1984	Ord River Station 200km S Kununurra	Brahman cross	1980-82	15	0	0	Mar-Apr
15.2	Carrick & Pratchett 1984	Ord River Station 200km S Kununurra	Shorthorn	1980-82	14	0	0	Mar-Apr
15.3	Holm 1971	Packsaddle Plains 15°31'S;128°43'E	Shorthorn	1967-70	17	18	20R	all year
15.4	Pratchett 1986	Ord River Station 200 km S Kununurra	Mixed	1980-85	24	0	0	Mar-May
15.5	Pratchett 1986	S of Broome	Brahman	1983-86	14	0	0	all year
15.6	Pratchett 1987	Blackgin, ORRS	Brahman cross	1984-86	15	15	0	all year
15.7	Pratchett 1987	Tweed ORRS	Brahman cross	1984-86	15	15	0	all year
15.8	Pratchett 1987	Tom Gee ORRS	Brahman cross	1984-86	15	15	0	Nov-May
16. Western Australia -								
16.1	Gardiner et al 1983	Prarie Downs 23°45'S;119°39'E	Shorthorn	1973-76	17	16	0	all year
16.2	Kok et al 1987	Boodarie 20°25'S;118°28'E	Shorthorn	1980-85	21	20	0	all year

## FOR BREEDER FERTILITY, MORTALITY AND LIVELINE IN NORTH AUSTRALIA

Class	Pregnancy Rate %			Calve Rate %	Brand Rate %	% Loss to Brand	% Died	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet

**Kimberleys**

COWS				45-63						
COWS				47-66						
COWS				70-80	62-74		1	315-345	290-330	320-375
COWS				26-66		3-11				
COWS				42-65						
COWS					45		14			
COWS					84		6			
COWS					72		7			

**Pilbara**

COWS					54-78		8-23			
COWS					60-81		5			

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**APPENDIX 2**

**Basic Biological Data for Growing Animals in North Australia**

- A. Sources, indices and production data**
- B. References**

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>1. Queensland -</b>					
1.1	Bewg et al 1970	Oakwood, Kandanga 26°26'S;152°40'E		1966-68	16
1.2	Bryan & Evans 1971	Beerwah RS 26°40'S;153°02'E	Hereford	1966-67 1968-70	14 16
1.3	Donaldson & Larkin 1963	Orient, 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 & Bryan 1973	Beerwah RS 26°40'S;153°02'E	Hereford	1966-71	23
1.6	Evans & Biggs 1979	Beerwah RS 26°40'S;153°02'E	Hereford	1972-76	21
1.7	Gartner et al 1968	Coolum RS 26°31'S;153°04'E	Hereford	1965-67	14
1.8	Jones 1976	Samford 27°22'S;152°53'E	Hereford	1962-66	17
1.9	Jones 1984	Beerwah RS 26°40'S;153°02'E	Hereford	1977-82	19
1.10	Jones & Jones 1984	Samford RS 27°22'S;152°53'E	Belmont Red	1975-80	19
1.11	Knights & Venamore 1985	Koumala	Brahman cross	1982-83	10
1.12	Mellor et al 1983	Utchee Creek 17°30'S;146°E	Brahman cross	1973-76	15
1.13	Mellor & Round 1974	Utchee Creek 17°30'S;146°E	Mixed	1968-70	18
1.14	Miller & van der List 1976	Walkamin RS 17°7'S;145°26'E	Brahman cross	1964-71	25
1.15	Round et al 1982	Utchee Creek 17°30'S;146°E	Brahman cross	1968-72 1968-72	22 20
1.16	Tierney & Goward 1983	Coolum RS 26°31'S;153°04'E	Hereford	1970-72	15

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
high rainfall							
.5-.8	steers					420-520	
.4	heifers					512	
.2	steers					473	
	calves				539-738		
.1	heifers					480	
.4-.8	steers					388-620	
.4-1	calves	34	195-207		803-855		
	steers			-537	452-463		
.2	yearlings					366	
.4	yearlings					299-534	
.4-.7	steers					234-803	
	steers					250	
.3-.6	weaners					370-468	
.3-.5	steers					570-610	.9
.2-.3	steers			310-610	500-670	430-638	
.3	weaners					430-630	
.4	steers					521-810	
.1-.2	steers			-220	480-690		

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>1. Queensland -</b>					
1.17	Tierney & Taylor 1983	Coolum RS 26°31'S; 153°04'E	Bos indicus	1972-75	18
1.18	Tierney et al 1983	Coolum RS 26°31'S; 153°04'E	Hereford	1972-75	17
1.19	Tierney et al 1985	Coolum RS 26°31'S; 153°04'E	Hereford	1973-76	16 13
1.20	Whiteman et al 1985	Mt Cotton RS 27°30'S; 153°40'E	Hereford	1975-80	17
1.21	Wilson & Holmes 1988	King Ranch, Tully 18°S; 146°E	Brahman cross	1981-83	14
1.22	Winks et al 1979a	Kairi RS 17°14'S; 145°34'E	Mixed	1970-75	16
1.23	Winks et al 1980b	Kairi RS 17°14'S; 145°34'E	Brahman cross	1971-73	17
1.24	Winks et al 1983	Kairi RS 17°14'S; 145°34'E	Brahman cross	1974-77	20
<b>2. Queensland -</b>					
2.1	Barnett et al 1979	Taranga, Bloomsbury 21°18'S; 148°25'E	Mixed	1966-68	16
2.2	Donaldson et al 1964	Cromarty 19°25'S; 147°5'E	Shorthorn	1960-61	11
2.3	Edye et al 1972	Lansdown 19°6'S; 146°8'E	Droughtmaster	1964-68	20
2.4	Entwistle & Goddard 1984	Fletcherview 19°50'S; 146°20'E	Bos indicus	1979-83	20 24
2.5	Gillard 1979	Kangaroo Hills 18°50'S; 145°40'E	Brahman cross	1965-75	24
2.6	Gillard et al 1980	Wrotham Park 17°S; 144°E		1972-77	13
2.7	Gillard et al 1980	Lansdown 19°6'S; 146°5'E		1973-77	13
2.8	Gillard et al 1980	Kangaroo Hills 18°50'S; 145°40'E		1973-77	13

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
high rainfall							
	calves	32-34	192-204		640-700		
	steers				500-580		
	calves	32-34	185-202		665-722		
	weaners	252-280		379-642			
.2-.3	steers					306-348	
.4	steers			285-295	285-340		
	steers					415-435	
.4	steers					573-636	
.2-.3	steers			300-520	640-950	510-570	
northern spear grass							
	steers					347-373	
	heifers					246	
1.8	calves	28-32	186-207				
	calves		123-170				
	weaners	150-230	235-294				
4.8-9.6	weaners					323-915	
	steers					380-440	
	steers					390-430	
	steers					350-390	

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>2. Queensland -</b>					
2.9	Holroyd & Dunster 1978	Swan's Lagoon 20°05'S;147°14'E	Droughtmaster	1975-77	14 14
2.10	Holroyd et al 1979	Swan's Lagoon 20°05'S;147°14'E	Shorthorn	1970-73	19
2.11	Holroyd et al 1979	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1970-73	19
2.12	Holroyd 1980	Swan's Lagoon 20°05'S;147°14'E	Bos indicus	1972-77	25
2.13	Holroyd et al 1983	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1973-77	21
2.14	Holroyd et al 1984	Swan's Lagoon 20°05'S;147°14'E	Bos indicus	1977-81	23 23
2.15	Holroyd et al 1988a	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1977-80	19
2.16	Holroyd et al 1988b	Swan's Lagoon 20°05'S;147°14'E	Droughtmaster	1977-80	18
2.17	McLennan et al 1981	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1975-79	23
2.18	McLennan et al 1984	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1982-83	10
2.19	Winks et al 1972	Swan's Lagoon 20°05'S;147°14'E	Mixed	1970-71	14
2.20	Winks et al 1974	Swan's Lagoon 20°05'S;147°14'E	Shorthorn	1965-69	18
2.21	Winks et al 1976	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1970-73	20
2.22	Winks & O'Rourke 1977	Swan's Lagoon 20°05'S;147°14'E	Mixed	1971-73	15
2.23	Winks et al 1977a	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1973-75	14
2.24	Winks et al 1977b	Swan's Lagoon 20°05'S;147°14'E	Shorthorn	1970-73	21
2.25	Winks et al 1977b	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1970-73	21



## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
northern spear grass							
	weaners			186	254		
	heifers			-333	639		
	calves	26-31	121-148		501-648		
	calves	30-33	150-171		650-763		
	calves	28	177		820		
	calves	32-34	165-184		730-840		
	steers			-250-220	630-1130	420-530	
	steers			-520-270	470-930	240-430	
	calves	30-34	152-162		805-855		
	calves	27-32	157-179		715-820		
2.7	steers			-25-214	618-836	297-375	
2.3	weaners	139		11			
	steers			143	694	488	
1.2-4	steers					96-182	
1.8	weaners			-123-62	595-675	280-445	
2.0	steers			-208- -170	466-693		
	steers				584-621		
2.0	steers		338-447	-246-32	580-1040		
2.0	steers		385-456	-150-108	720-1140		

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>2. Queensland -</b>					
2.26	Winks et al 1978a	Swan's Lagoon 20°05'S;147°14'E	Bos Indicus	1969-72	19
2.27	Winks et al 1978b	Swan's Lagoon 20°05'S;147°14'E	Bos Indicus	1970-73 1971-74	18 19
2.28	Winks et al 1979b	Swan's Lagoon 20°05'S;147°14'E	Brahman cross Bos Indicus	1970-73 1971-75	20 23
2.29	Winks et al 1980a	Swan's Lagoon 20°05'S;147°14'E	Bos Indicus	1971-77	26
2.30	Winks et al 1982	Swan's Lagoon 20°05'S;147°14'E	Brahman cross	1973-77	23
<b>3. Queensland -</b>					
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 et al 1964	Brian Past., Gayndah 25°38'S;151°47'E	Hereford	1955-60	25
3.4	Alexander & Beattie 1968	Brian Past., Gayndah 25°38'S;151°47'E	Hereford	1955-62	26
3.5	Barr & Burns 1971	Glenhowden, Harlin 26°55'S;152°20'E	Hereford	1969-70 1967-68 1968-69	10 10 14
3.6	Bisset & Marlowe 1974	Charnwood, Lowmead 24°40'S;151°38'E	Brahman cross	1966-71	18
3.7	Bisset & Marlowe 1974	Gilgoongan, 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

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
northern spear grass							
	calves	31-34	156-164		675-730		
	weaners					280-445	
	steers		304-395			225-385	
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	
southern spear grass							
.6-.8	weaners			191		416	
.8	weaners				607-704		
	calves	31-34	141-175		626-753		
	weaners		215-266				
	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

Key	Reference	Site	Breed	Years	Index
<b>3. Queensland -</b>					
3.11	Coates & Bean 1978	Narayan, Mundubbera 25°41'S; 150°52'E	Mixed	1971-73	14
3.12	Coates et al 1987	Narayan, Mundubbera 25°41'S; 150°52'E	Hereford	1973-78	19
3.13	Coates et al 1987	Narayan, Mundubbera 25°41'S; 150°52'E	Belmont Red	1973-78	19
3.14	Cooksley & Paton 1982	Brian Past., Gayndah 25°38'S; 151°47'E	Brahman cross	1979-81	17 17
3.15	Corliss et al 1980	Mt Eugene, Jamblin 24°10'S; 150°25'E	Mixed	1972-75 1973-76 1974-77	14 18 18
3.16	Foster & Blight 1983	Brian Past., Gayndah 25°38'S; 151°47'E	Hereford	1977-78 1978-79	11 11
3.17	Foster & Blight 1984	Brian Past., Gayndah 25°38'S; 151°47'E	Hereford	1973-79	20
3.18	Frisch 1973	Belmont, Riton 23°15'S; 150°25'E	Bos indicus	1954-69	26
3.19	Gillard et al 1980	Westwood 23°39'S; 150°07'E		1975-77	9
3.20	Graham & Mayer 1972	Lowville, Marlborough	Brahman	1966-67 1967-68	12 12
3.21	Kennedy & Churchill 1971	Belmont, Riton 23°15'S; 150°25'E	Mixed	1964-69	22
3.22	Knights & Venamore 1985	Duarlinga	Santa Gertrudis		11
3.23	Knights & Venamore 1985	Marlborough	Bos indicus	1981-82	9
3.24	Knights & Venamore 1985	Childers	Brahman cross	1981-82	11
3.25	Knights & Venamore 1985	Marlborough	Brahman cross	1982-83	10
3.26	Knights & Venamore 1985	Childers	Brahman cross	1982-83	13

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
southern spear grass							
	weaners					342-434	
4	calves		186		705		
4	calves		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	
	calves	29-34	161-195				
	calves					554	
	steers				685		
	calves		250		920		
	steers					190	
	calves		248		670		

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
3. Queensland -					
3.27	Knights & Venamore 1985	Childers	Brahman cross	1983-84	9
3.28	Laing et al 1984	Brian Past, Gayndah 25°38'S; 151°47'E	Bos indicus	1979-82	17
3.29	Mannetje & Coates 1976	Narayan, Mundubbera 25°41'S; 150°52'E	Hereford	1972-75	17
3.30	Milles et al 1982	Brian Past, Gayndah 25°38'S; 151°47'E	Sahiwal- Hereford	1979-80	12
3.31	Milles et al 1982	Narayan, Mundubbera 25°41'S; 150°42'E	Belmont Red	1979-80	12
3.32	Nicol & Smith 1981	Palm Range, Bundaberg 24°34'S; 151°49'E	Braford	1977-78	15
3.33	Nicol et al 1982	Charnwood, Lowmead 24°40'S; 151°38'E	Brahman cross	1971-74 1974-75	17 11
3.34	Selfert et al 1974	Mt Eugene, Jambin 24°10'S; 150°25'E	Mixed	1972-73	10
3.35	Selfert et al 1980	Mt Eugene, Jambin 24°10'S; 150°25'E	Bos indicus		14 18 18
3.36	Shaw 1978	Rodd's Bay, Gladstone 24°05'S; 151°30'E	Mixed	1966-73	26
3.37	Shaw & Mannetje 1970	Rodds Bay 24°05'S; 151°30'E	Hereford	1959-66	21
3.38	Sutherland 1959	Brian Past, Gayndah 25°38'S; 151°47'E	Hereford	1954-58	19 15 15 17
3.39	Venamore 1981	Nether Haven 30 km NE R'ton	Brahman cross	1979-80	12

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
southern spear grass							
	calves				943		
.4-1.0	weaners		318-362			360-480	
	calves		218		800		
	heifers	188	252		315		
	heifers	230	345		518		
	weaners		237	105	230	170	
.7-1.7	weaners			288-339		408-463	
.7-1.8	steers			488		464	
	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	

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>4. Queensland -</b>					
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
4.3	Knights & Venamore 1985	Bauhanla Downs	Brahman cross		11
4.4	Rudder & Barnett 1979	Broadmeadow, Nebo 21°45'S;148°20'E	Bos taurus	1966-70	18
4.5	Russell 1985	Tong Park, Kogan 27°2'S;150°55'E	Hereford	1974-79	18
<b>5. Queensland -</b>					
5.1	Plasto et al 1976	Moombidary, Hungerford 28°50'S;143°40'E	Shorthorn	1972-75	18
<b>6. Queensland -</b>					
6.1	Cheffins 1980	Stirling Downs, Tambo	Santa Gertrudis	1977-79	11
6.2	Dodt et al 1984	Toorak RS, Julia Crk 21°2'S;141°48'E	Mixed	1980-82	16
6.3	Knights & Venamore 1985	Barcaldine	Devon	1981-83	12
6.4	Knights & Venamore 1985	Barcaldine	Hereford	1981-82	11
6.5	Knights & Venamore 1985	Blackall	Brahman cross	1983-84	8
6.6	Murphy 1985	Hazelwood, Richmond	Brahman cross	1982-84	12 12



## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
<b>aristida/bothriochloa</b>							
	calves		176-210				
	weaners	230	277				
	steers		425				
	calves		184-199				
	steers					518	
	calves		175-199				
.8-4	steers				360		
<b>mulga</b>							
	calves		154-200				
<b>mitchell grass downs</b>							
18-28	heifers					360	
	steers			-167	536	361	
	steers			320		330	
	steers					380	
	steers				570		
	weaners					495	
	steers					215	

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>7. Queensland -</b>					
7.1	Clarke & Wythes 1988	Bulloo Downs, Thargomindah 28°30'S;140°E	Shorthorn	1983-86	9
7.2	Clarke & Wythes 1988	Bulloo Downs, Thargomindah 28°30'S;140°E	Brahman cross	1983-86	9
<b>8. Queensland -</b>					
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
<b>9. Queensland -</b>					
9.1	Boorman & Hosegood 1986	Crocodile, Laura	Brahman 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
9.3	Winter et al 1977b	Heathlands, Weipa 11°42'S;142°37'E	Brahman cross	1974	7
<b>10. Queensland -</b>					
10.1	Cheffins 1977	Frankfield 100 km NW Clermont	Brahman cross	1975-76	14
10.2	Coaldrake et al 1969	Tarewinnabar, Goondiwindi 28°S;150°E			15
10.3	Coates et al 1987	Narayan, Mundubbera 25°41'S;150°52'E	Hereford	1973-78	20
10.4	Coates et al 1987	Narayan, Mundubbera 25°41'S;150°52'E	Belmont Red	1973-78	20
10.5	Corliss & Taylor 1979	Wirranda, Moura	Mixed	1978-79	11
10.6	Graham et al 1983	Brigalow RS, Theodore 24°50'S;149°45'E	Hereford	1972-75	13

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
<b>spinifex</b>							
	steers					348	
	steers					365	
<b>gulf lowlands</b>							
	weaners	214	337				
	weaners		231	113	510	293	
	weaners					325	
<b>peninsula</b>							
	calves	115-122	161-213				
	weaners				193-346	138-191	
.5-1.4	steers					310-360	
.8	steers					390	
<b>brigalow</b>							
	steers			228	417	350	
1.1-2.2	steers					490-500	
1.7	calves		221		782		
1.7	calves		233		851		
	steers					393	
	weaners			438-458			

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<hr/>					
10. Queensland -					
10.7	Knights & Venamore 1985	Clermont	Brahman		12
10.8	Knights & Venamore 1985	Emerald	Brahman cross		12
10.9	Knights & Venamore 1985	Moura	Brahman cross		12
10.10	Knights & Venamore 1985	Duarlinga	Droughtmaster		11
10.11	Knights & Venamore 1985	Duarlinga	Droughtmaster	1981-83	9
10.12	Knights & Venamore 1985	Banana	Brahman cross	1983-84	11
10.13	Mayer et al 1980	Berrigurra, Blackwater 23°30'S;149°E	Brahman cross		14 13 13
10.14	Plasto et al 1983	Taroom 26°S;150°E	Hereford	1977-78	11
10.15	Rudder & Short 1978	Consuelo 24°45'S;148°25'E	Bos indicus	1975 1975-76 1976-77 1977-78	10 14 9 9
10.16	Rudder et al 1980	El Rocco, Moura 24°S;149°E	Brahman cross	1977 1977-78	10 9
10.17	Strachan et al 1980	Sunnyholt, Injune 26°S;148°E	Mixed	1975-78	16 16
10.18	Walker et al 1987	Brigalow RS, Theodore 24°50'S;149°45'E	Hereford	1968-72	21
10.19	Wood et al 1985	Brigalow RS, Theodore 24°50'S;149°45'E	Mixed	1976-79	18 17

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
<hr/>							
<b>brigalow</b>							
	heifers					406	
	weaners					312	
	steers					319	
	weaners					533	
	steers					535	
	steers					550	
	weaners		210		413		
	yearlings		478			650	
	steers	566		497			
	steers					220	
	calves		197				
	weaners	207	331				
	steers		515				
	steers		552				
2	calves		182				
	weaners		222				
1.3	weaners					590	
	steers					476	
.7-2.4	steers				510-720	434	
	calves	29-32	150-179				
	weaners	193-225		97-293			

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>11. Northern Territory</b>					
11.1	Austin 1970	Douglas Daly 13°48'S; 131°12'E	Brahman cross	1969-70	9
11.2	Dance 1977	Katherine E.F.	Shorthorn	1970-71	14
11.3	Eggington et al 1984	Mt Bunday 13°05'S; 131°07'E	Brahman cross	1980-81	15
11.4	Eggington et al 1986	Mt Bunday 13°05'S; 131°07'E	Brahman cross	1983-84	11 9
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; 131°25'E	Mixed	1963-69 1963-69	23 23
11.10	McCosker 1987a	Mt Bunday 13°05'S; 131°07'E	Brahman cross	1983-84	13
11.11	McCosker 1987b	Mt Bunday 13°05'S; 131°07'E	Brahman cross	1980-84	14
11.12	McCosker & Eggington 1986	Mt Bunday No. 1 13°05'S; 131°07'E	Brahman cross	1981-84	14 13
11.13	McCosker & Eggington 1986	Mt Bunday No. 2 13°05'S; 131°07'E	Brahman cross	1980-84	18 17
11.14	McCosker & Eggington 1986	Mt Bunday No. 3 13°05'S; 131°07'E	Brahman cross	1980-84	18 17
11.15	McCosker & Eggington 1986	Mt Bunday No. 4 13°05'S; 131°07'E	Brahman cross	1980-84	18 15
11.16	McCosker & Eggington 1986	Mt Bunday No. 5 13°05'S; 131°07'E	Brahman cross	1982-84	13 11
11.17	McCosker & Eggington 1986	Mt Bunday No. 6 13°05'S; 131°07'E	Brahman cross	1980-84	20 17

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
Darwin/Gulf							
.4-1.6	steers			-180	816	382	
.8	steers			410-490	1190		
	weaners	123	206			228	
	weaners helpers			166 40	560		
	steers			-213--5	454-530	218-316	
.2-.8	yearlings					212-262	
	steers					132-276	
	steers					79-149	
	calves weaners	26-30	106-128 182-244				
.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						

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
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## 11. Northern Territory -

11.18	McCosker et al 1984	Mt Bunday 13°05'S; 131°07'E	Brahman cross	1980-82	20
11.19	Norman 1967	Katherine	Mixed	1962-65	20
11.20	Wesley-Smith 1972	Adelaide River 13°05'S; 131°15'E	Shorthorn	1966-68	17
11.21	Wesley-Smith 1972	Adelaide River 13°05'S; 131°15'E	Brahman cross	1966-68	15

## 12. Northern Territory -

12.1	Ford & Hill 1977	Kidman Springs 15°58'S; 131°E	Shorthorn	1971-72	13
12.2	Hill & Robertson 198?	Kidman Springs 15°58'S; 131°E	Shorthorn	1976-81	17
12.3	Moran 1972	Kidman Springs 15°58'S; 131°E	Shorthorn	1970-71	12
12.4	Pearson 1975	Kidman Springs 15°58'S; 131°E	Shorthorn	1974-75	11
12.5	Pearson 1977	Kidman Springs 15°58'S; 131°E	Mixed	1973-75 1973-76 1974-77	21 21 21
12.6	Robertson 1987	Kidman Springs 15°58'S; 131°E	Droughtmaster	1981-85	20 20 18
12.7	Sullivan 1988	Kidman Springs 15°58'S; 131°E	Droughtmaster	1986-87	15
12.8	Winter 1987	Manbulloo, Katherine 14°47'S; 131°57'E	Brahman cross	1980-83	17

## 13. Northern Territory -

NO DATA AVAILABLE



## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
Darwin/Gulf							
	weaners		178-205				24-32
5.6	heifers			-484- -306	527-654	111-198	
	steers			-250	550		
	steers			-350	640		
Victoria River District							
	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	
16	steers					170	
	weaners					230-307	

**Barkly Tableland**

NO DATA AVAILABLE

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>14. Northern Territory -</b>					
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 24°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'S;133°40'E	Shorthorn	1970-75	26 30
14.5	Low & Wood 1979	Hamilton Downs 23°30'S;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

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	

**Alice Springs**

steers						270	
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steers						432	
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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		

## SOURCES AND INDICES OF BASIC BIOLOGICAL DATA

Key	Reference	Site	Breed	Years	Index
<b>15. Western Australia -</b>					
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	Carrick & Pratchett 1984	Ord River Station 200 km S Kununurra	Brahman cross	1980-82 1980-82 1980-82	17 16 14
15.4	Dolling 1983	Derby 17°18'S; 123°37'E	Shorthorn	1971-72	10
15.5	Dolling 1983	Broome 18°S; 122°E	Shorthorn	1974-76	15
15.6	Hacker 1982	Ord RRS 200 km S Kununurra	Shorthorn	1979-81 1979-81	11 11
15.7	Holm 1971	Packsaddle Plains 15°31'S; 128°43'E	Shorthorn	1967-70	19
15.8	Holm & Payne 1980	Derby 17°18'S; 123°37'E	Shorthorn	1973-76	18
15.9	Holm et al 1981	Fitzroy PRS, Fitzroy Crossing 18°08'S; 125°19'E	Shorthorn	1971-76	22
15.10	Pratchett 1986	Ord River Station 200 km S Kununurra	Mixed	1980-85 1980-85 1980-86 1980-86	24 24 22 20
15.11	Pratchett 1986	Ord River Station 200 km S Kununurra	Brahman cross	1980-86	17
15.12	Pratchett 1986	Kununurra	Mixed	1984-86	14
<b>16. Western Australia -</b>					
16.1	Kok et al 1982	Boodarie Port Hedland	Shorthorn	1980-85	21

## FOR LIVELWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stocking Rate	Class	Weight (kg)		Average daily gain (g)			Mortality %
		Nov	May	Dry	Wet	Annual	
<b>Kimberleys</b>							
	weaners	109	177				
	weaners					290	
	steers					390	
	calves	31	133-150		540-590		
	weaners		277-324				
	steers	291-374	445-481				
	steers					240	
	steers				225-555	445-495	
	steers					385	
	helpers					320	
	calves				530-630		
	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	
<b>Pilbara</b>							
	steers						3

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