

The 1996-97 CSIRO Northern Australian beef industry survey: methods and data classification

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Summary

This document describes the survey methods used in the CSIRO Northern Australian Beef Industry Survey conducted in 1996/7. This survey examined herd husbandry and performance, how the natural resource base was managed and information management in the business. Many of the survey questions were cross-referenced to manage data quality.

The survey questions are presented in this document with explanatory notes detailing what information was being sought and any specific methods that were used. Extensive notes are also provided on the subsequent classification of the data for presentation in publications.

A total of 375 commercial beef producers in 8 survey regions participated in the survey. The Queensland component (n=297) constituted 79% of the survey group. This group represented a broad cross section of the northern Australian beef industry in terms of geographical spread, size of enterprise and herd and ownership structures. These regions are the major cattle producing areas of northern Australia that contributed to both meatworks and live export markets. Survey participation rate was 94% of producers approached with 3% of participants being unsolicited volunteers. More than 30% of the group were non-government agency clients or those that had irregular contact with such agencies. Producers were willing to participate since they felt the survey would provide useful information on the northern Australian beef industry that would assist with better planning and policy development in the future.

Business records were used to verify herd performance but no financial data were collected. No study of social factors affecting the business was made. Generally, the collection of records available to us from the farm business supported the survey activity's information requirements.

Problems were encountered due to the lack of standardisation of calculation of branding rate with 7 different methods encountered. There was also confusion in certain regions about the difference between the store market and the domestic market. There was also confusion caused by market codes on meatworks feedback sheets.

Issues concerning the learnings of the survey team are presented in the discussion.

A series of journal papers describing the survey findings are in preparation.

Keywords

northern Australia, beef cattle, live export, management practices, markets, survey, beef industry.

Introduction

In the mid-1990s, there was little detailed information available on the performance of commercial herds throughout northern Australia. Information concerning the performance of cattle in northern Australia has been primarily restricted to scientific publications (Holroyd and O'Rourke 1988; Hasker 2000). Most studies of commercial herd performance have been limited to small numbers of enterprises within restricted regions. The Australian Bureau of Agricultural and Resource Economics (ABARE) surveys of the beef industry collect information concerning socio-economic aspects of the industry but only a limited suite of performance data.

O'Rourke *et al.* (1992) conducted the last major survey in 1990 prior to the rapid expansion of the live cattle trade. With the expansion of the live export trade, there was growing industry and organisational concerns about the capacity of the northern Australian herd to meet the future demands for cattle from both the meatworks and live cattle trade. A better idea of the productivity, management and genotypes present in the northern herd was needed including estimates of the animal production capacity (growth and reproduction) of different northern Australian pasture communities.

To construct a more complete and detailed picture of the northern beef industry, we conducted a survey in 1996/7 that examined the performance of beef herds over the 1991/2 to 1995/6 financial years. This activity concentrated on areas of northern Australia where live cattle exports are important. The survey gathered information on many aspects of the northern industry including property ownership, business structures, production activities, pasture management and improvement, herd performance and management, markets and communication of information. This document describes the survey methods, provides explanatory notes for each survey question, and sets out the classifications used for data analysis and presentation.

Methods

Survey protocol

The survey was conducted by face to face interviews where a member of the survey team (n=3) visited the participants and completed the survey form with them. The analysis of business records required a significant time investment (3 hours) and followed a specific methodology. The face to face interviews ensured a uniform interpretation of questions and responses. The survey questions and notes to assist interpretation are presented later in this document (pages 17 - 53).

Survey structure

The survey was structured to examine the northern Australian beef industry from a systems perspective. A majority of the questions were in a multiple tick-a-box format. Data concerning property details and questions that required business records analysis were recorded in tabular format.

Business records were used to verify herd performance but no financial data were collected. No study of social factors affecting the business was made. We understood that the beef business exists in a dynamic and heterogeneous environment and we therefore recognised that

for many of the questions in the survey that there were no single actions or definitive answers and a number of activities or practices would be conducted in relation to particular activity. Examples of this would be the beef enterprises conducted on the property, target markets and pasture and herd management practices. Therefore, multiple responses to survey questions were permitted and collected.

The survey was made up of 4 sections:

1. General Property Information: location, property area, herd size, rainfall, soils and vegetation, multiple property ownership and types of production activities.
2. Property Management and Development: grazing and pasture management practices, infrastructure development, sown pasture species, use of fire, woody weeds.
3. Herd Management and Performance: herd management practices and policies of the producer with respect to joining, calving, weaning, culling and selection, herd health and nutrition, genotypes, genetic improvement, record keeping, hormonal growth promotant use, liveweight performance, market aspirations and specifications met. Property and business development aspirations for the next 5 years were also dealt with in this section.
4. Information Sourcing and Management: Sources of information used and preferred pathways of information transfer were examined (Bortolussi *et al.* 1999).

To manage the quality of data collected, most survey questions were cross-referenced where responses to a particular question could be cross-checked and/or validated by the response to a previous or subsequent question.

Survey classifications

Prior to dealing with the survey in further detail, it is appropriate to present the classification systems used for the regions, production activities, business structure, pasture communities and types, cattle genotypes and market descriptions.

Survey population and regions

It was our intention to survey a broad cross section of the northern Australian beef industry. Commercial (corporate and private) beef producers were surveyed and were largely recruited through direct approach, local networks and advertisement. Co-operating producers were selected on the basis of being a commercial entity with sufficient detailed records to meet the information requirements of the survey activity. A commercial producer was defined as an entity with full-time participation in primary production, particularly the beef industry. We acknowledge that this survey is not a truly random sample due to these selection criteria applied to participants.

A total of 375 commercial beef producers in 8 survey regions (Table 1 and Figure. 1) participated in the survey. The Queensland component (n=297) constituted 79% of the survey group with 10% from the Northern Territory and 11% from northern Western Australia. The regions surveyed are the major cattle producing areas of northern Australia that contributed to both meatworks and live export markets.

Table 1. The distribution of the 375 survey participants across eight northern Australian regions.

State	Queensland					Northern Territory	Western Australia	
Region	Central Coastal	Central Highlands	Central West	Maranoa-South West	North West	Northern Territory	Western Australia	
Symbol	CCQ	CHQ	CWQ	MSW	NWQ	NQ	NNT	NWA
N	46	66	33	46	54	52	38	40

These regions were formed on a bio-geographic basis in an effort to capture the major northern Australian pasture communities (Tothill and Gillies 1992) using appropriate shire or government divisions to define the regional boundaries.

The Peninsular portion of north Queensland (Cook Shire), south east coastal Queensland, and the Darling Downs regions of Queensland were not included in this survey due to their relatively small cattle populations or their lower relative importance for supplying cattle to the live export markets.

Central Coastal Queensland (CCQ): the coastal and sub-coastal shires of central Queensland from Proserpine through to Gayndah in the southern Burnett. No coastal properties south of Gladstone were surveyed. Broadsound Shire properties east of the Isaac River were included in the Central Coastal region.

Central Highlands Queensland (CHQ): located to the west of CCQ, was composed of Bauhinia, Belyando, Duaringa, Emerald, Jericho, Nebo and Peak Downs Shires. The eastern desert uplands (north of latitude 22° 30'S and east of longitude 145° E) were included in the CHQ due to the large representation of this community in the CHQ region. A small number of properties in southern Bowen Shire (Mt Coolon district) were included in CHQ due to strong soil and vegetation similarities with the neighbouring Belyando Shire. Broadsound Shire properties west of the Isaac River were classified as belonging to the CHQ region.

Central West Queensland (CWQ): shires extending from the Queensland-Northern Territory border (Bouli Shire) to Aramac Shire in the east and south to Tambo and Isisford Shires.

Maranoa-South West (MSW): shires extending from the western edge of the Darling Downs (Chinchilla Shire) to the Queensland border with the Northern Territory, South Australia and New South Wales. In the east of this region, survey properties tended to be north of the Warrego Highway (Taroom and Bungil Shires) and as a result the mixed grazing-broad acre cropping country (Southern Rolling Downs/Mitchell grass) was not captured in this survey.

North West Queensland (NWQ): the shires bounded by the Northern Territory border, the Gulf of Carpentaria and Winton and Bouli Shires in the south. Flinders Shire was divided at longitude 144° 30'E to exclude the eastern desert uplands from the NWQ region. The area west of this line was included in the North West region due to the large representation of Mitchell grasslands.

Northern Queensland (NQ): the shires extending from Dalrymple and Bowen in the south east to Etheridge and Mareeba in the north and the eastern portion of Flinders Shire.

Northern Territory (NNT): Barkly (n=10), Katherine (n=9), Darwin (n=8) and Victoria River (n=11) Districts. Alice Springs, Arnhem, Gulf and Tennant Creek Districts were not surveyed due to either low cattle populations or their lower relative importance for supplying cattle to the live export markets.

Western Australia (NWA): the northern half (Kimberley (n=26) and Pilbara (n=14) Districts) of the state (i.e. north of 24° latitude). The far northern Kimberley properties (north of the Gibb River Road) were not surveyed. Kimberley properties were predominantly located in the west Kimberley and Ord-Victoria Districts.

Since the end of the survey activity, some of the areas that were not surveyed have assumed a larger importance to the live export markets as demand for cattle increased.

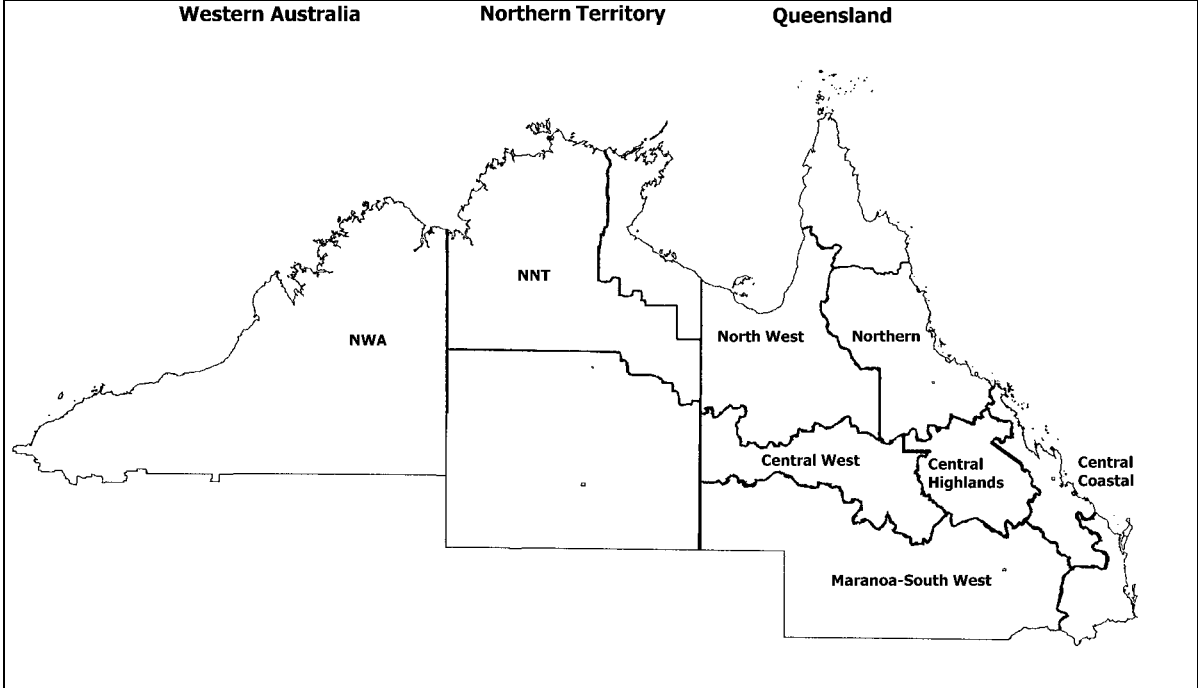


Figure 1. Northern Australian survey regional boundaries.

Beef production activities

Beef production activities were classified to provide a detailed description of what was carried out on the properties (Table 2).

Table 2. Classification criteria and definitions for production activity.

Production activity	Definitions
Backgrounding	Cattle are preconditioned on pasture, crop, grain or combinations thereof prior to feedlot induction. Enterprises that held cattle for short periods prior to dispatch for live export were included in this category.
Breeding & finishing at pasture	Cattle are bred and fattened on pasture on the property. The fattening of cull females after removal from the breeder herd was included in this category.
Breeding & finishing in feedlot	Cattle are bred on the property and fattened in a feedlot on the property.
Breeding & finishing on crop	Cattle are bred on the property and fattened on crops grown on the property.
Breeding stores	Cattle are bred on the property for finishing elsewhere in Australia.
Buying ^A & finishing stores in feedlot	Unfinished cattle are purchased for fattening in a feedlot on the property.
Buying ^A & finishing stores on crop	Unfinished cattle are purchased for fattening on crops grown on the property.
Buying ^A & finishing stores on pasture	Unfinished cattle are purchased for pasture fattening on the property.
Live cattle export	Cattle are supplied to either the SE Asian or Middle East export markets.
Seedstock	A nucleus breeding or stud operation is run on the property for use in the herd and/or for commercial sale to other herds.

^A Buying also includes the transfer of cattle between properties of common ownership.

Business structure and property ownership

A number of properties were run in conjunction with one or more additional properties under a variety of business arrangements. Where this occurred, the links to the additional properties were recorded. The methods for recording data from the additional properties depended on the business structure of the enterprises. Where the multiple properties were run as one business unit, the data were recorded for the combined properties rather than the properties separately. Where the properties were run independently, data were recorded for the individual properties. For some large companies, not all properties were surveyed, but the existence of all additional properties was noted. Production activities conducted on the additional properties were recorded to examine if there were specialist uses of these properties.

Pasture communities

The classification of pasture communities of northern Australia was based on Tothill and Gillies (1992). Consideration was given to having a highly detailed vegetation classification but a more concise listing was deemed appropriate for our classification and reporting requirements. Some of the subcategories of Tothill and Gillies (1992) have been used as major pasture communities due to their significance for beef production.

Although it would have been desirable to be able to classify pasture communities exactly into the Tothill and Gillies (1992) system, it was recognised that the face to face survey technique would provide adequate information for only a broad classification to be carried out. The classification system used in this survey also recognises the existence of minor pasture communities within larger communities (e.g. bluegrass or brigalow within black speargrass). Local vegetation classification maps were used where available.

An aim of this work was to determine the capacity of pasture communities to support cattle growth. Particular emphasis was given to identifying pasture communities that were used for the purpose of growing and finishing cattle. Where appropriate, the Tothill and Gillies (1992) Local Pasture Units (LPU) numbers of the vegetation group has been listed below.

- Acacia woodland-fertile soils (e.g. blackwood)

There is no LPU for this community

This classification recognises Acacia woodlands on fertile soils, other than brigalow and gidgee. Areas of blackwood (*Acacia argyrodendron*) are often locally significant for beef production, although less widespread than the brigalow and gidgee communities which have been allocated separate classifications. Heavy prickly acacia (*Acacia nilotica*) infestations were recorded as Acacia woodland-fertile soils.

- Acacia woodland-infertile soils (e.g. lancewood or pindan)

Includes LPU 96

This generic classification was used as it was considered that there would not be a detectable production difference between the Acacia woodlands on infertile soils in northern Australia. This community is rarely used for growing or finishing of cattle. Lancewood (*Acacia shirleyi*) communities occur through Queensland and the Northern Territory (Anderson 1993). The Pindan community (LPU 96) is found, particularly in the south west Kimberley region (Petheram *et al.* 1983). The Queensland component of this classification has no LPU.

- Annual sorghum/Annual tallgrass

LPU 16 - 24

This community classification was used for the annual sorghum communities of the monsoonal tropics. It was comprised primarily of annual *Sorghum* spp. but also included the *Schizachyrium* spp. pastures of Cape York and Carpentaria areas of northern Queensland.

- Annual shortgrass

LPU 143 - 147

This community includes the short annual species such as *Enneapogon* spp. (bottle washer or limestone grass) and *Aristida* spp. (white, bunched or mulga spear or kerosene grass) which are predominantly found in north west and central Australia associated with alluvial or calcareous loamy soils.

- *Aristida-Bothriochloa* + narrow leaf ironbark

- *Aristida-Bothriochloa* + silver leaf ironbark

- *Aristida-Bothriochloa* + box

LPU 41 - 55 (excluding LPU 53)

The two ironbark communities recognise the differences in soil fertility and use for cattle production activities between them. These communities were distinguished from black speargrass by examination where practical, or if the survey response indicated the existence of forest, desert or pitted bluegrass (*Bothriochloa* spp.) and/or the wire grasses or white speargrasses (*Aristida* spp.) as dominant pasture species. The narrow leaf ironbark category applied to *Eucalyptus crebra* and *Eucalyptus drepanophylla* while silver leaf ironbark applied to *Eucalyptus melanophloia* and *Eucalyptus shirleyi*.

In some cases there are areas where the ironbarks were absent and the main tree species present were classified as being of “box” type (*Eucalyptus populanea*, *Eucalyptus brownii*,

Eucalyptus moluccana and *Eucalyptus normantonensis*). This classification also included the *Aristida-Bothriochloa* communities found in the Northern Territory.

- Black speargrass

LPU 28 - 30

Traditionally, the black speargrass (*Heteropogon contortus*) community is often broken up into “North” and “South” with the division occurring either at Proserpine (20° 30’ S) or Marlborough (22° 50’ S). Tothill and Gillies (1992) split the community onto three groups “North, Central and South”. We adopted the Proserpine division with the southern boundary of the Northern region being near this locality. Therefore, black speargrass occurring south of this region or below this latitude is considered to be part of the southern black speargrass community.

- Blady grass

LPU 27

This community accounted for the areas of the coastal lowlands of low fertility dominated by blady grass (*Imperata cylindrica*) which may be found in association with black speargrass and kangaroo grass (*Themeda triandra*).

- Blue bush

LPU 148 - 151

This community describes the periodically flooded chenopod (saltbush related) (*Chenopodium* and *Maireana* spp.) shrubland communities found in western Queensland’s channel and border country through the Barkly region of the Northern Territory, and in the Pilbara.

The bluegrass communities of northern Australia were classified into three distinct communities:

- Bluegrass-browntop

LPU 67

- Queensland other

LPU 65 and 66

- NW Australia (north western Australia bluegrass communities)

LPU 68 - 71

This classification system was used due to the different compositions of the bluegrass communities in Queensland and the different production potential of the various communities across northern Australia. The bluegrass-browntop community contains mainly *Dichanthium fercundum* and *Eulalia aurea* while the bluegrass communities of NW Australia contain mixtures of *Dichanthium* spp. *Bothriochloa* spp. and *Eulalia aurea*. The Queensland other category was used to accommodate the pasture communities of central and southern Queensland dominated by Queensland bluegrass (*Dichanthium sericeum*).

The brigalow (LPU 59 - 61) communities were divided into three groups:

- Brigalow (dominated by brigalow with other species in minority)

- Brigalow-softwood scrub (mixed brigalow - softwood scrub species)

- Softwood scrub (softwood species dominant, brigalow in minority)

Our classification of brigalow (*Acacia harpophylla*) communities corresponds with that of Tothill and Gillies (1992) who used three broad classifications: North (brigalow dominant), Central (brigalow mixed with softwood scrub) and South (primarily dominated by softwood scrub or associated with belah (*Casuarina cristata*)) which respectively correspond to the classifications above. It was recognised that these three communities occur across a number of regions so the references to “North, Central and South” were dropped.

- Cypress pine

LPU 53

Although broadly part of the *Aristida-Bothriochloa* pasture community, the abundance of cypress pine (*Callitris columellaris*) warranted separate classification. In particular regions of Queensland, widespread areas of this community were encountered in the survey.

- Gidgee

LPU 62 - 64 and 128 - 129

This classification incorporated both major species of gidgee (*Acacia cambagei* and *Acacia georginae*). Areas of the Mitchell grasslands in Queensland locally dominated by *Acacia cambagei* woodland were classified as a Gidgee community if they were described as having more than scattered trees with a Mitchell grass pasture. There is a significant area of this community and there has been considerable clearing and/or development of this country for pasture improvement. This community was recognised as being more productive than Mitchell grasslands.

- Mitchell grass

LPU 72 - 89

This classification included all *Astrebla* spp. pastures and no distinction was made between species. The regional break up of northern Australia recognises the diverse and widespread nature of this community noted by Tothill and Gillies (1992). This classification includes communities lightly timbered with mulga, gidgee or *Acacia nilotica* (prickly acacia). Little if any Mitchell grass country covered in this survey had heavy infestations of prickly acacia (*Acacia nilotica*) since most cattle production appeared to be carried out on the more sparsely timbered country. Heavy *Acacia nilotica* infestations were recorded as Acacia woodland-fertile soils.

- Mulga

LPU 138 - 140

As with Mitchell grass, no differentiation of mulga (*Acacia aneura*) communities was considered. An area was given this classification when the community contained more than scattered mulga trees.

- Perennial tallgrass other

LPU 14 - 15

Since various perennial tallgrass communities were classified separately, particularly ribbongrass, this is a residual community classification which covers perennial sorghum (such as plume sorghum; *Sorghum plumosum*), white grass (*Sehima* spp.) and wanderrie grass (*Eriachne* spp.) based communities of the far north of Western Australia, Northern Territory and Queensland.

- Rainforest

LPU 25

This classification was used for areas with undeveloped rainforest or pastures developed after clearing of rainforest communities as found in the wet tropics of Queensland. Introduced grass, and to a lesser extent associated legume, species constitute these pastures.

- Ribbongrass

LPU 7 - 13

Ribbongrass or golden beardgrass (*Chrysopogon fallax*), a perennial tallgrass, is classified separately due to its significant area and its importance for cattle breeding and growing cattle in northern Australia, particularly in the Northern Territory and Western Australia.

- Riverine plains (Channel country)

LPU 56

This community occurs on the flood plains of the Diamantina, Georgina, Thompson and Bulloo rivers. Although similar country occurs on the Mitchell grasslands, these were not classified as Channel country since the classification was reserved for the large inland flood plains.

- Saltwater couch (Marine plains)

LPU 131 - 134

This community accounts for the areas of coastal northern Australia where marine plains country are used for grazing. The dominant pasture species are marine or saltwater couch (*Sporobolus virginicus* or *Xerochloa barbata*).

- Spinifex

LPU 90 - 123

The numerous subcategories of the spinifex (*Triodia* and *Plectrachne* spp.) communities were not separated in this survey primarily because this country is used primarily for breeding not growing. Some spinifex associations were classified into other communities.

- WA short tussock grass

LPU 130

This Western Australian (Pilbara) pasture community is composed primarily of the perennial tussock species, particularly Roebourne Plains grass (*Eragrostis xerophilla*) which may occur in association with soft spinifex (*Triodia pungens*).

Pasture types

For the many pasture communities it was considered that the most useful description of pasture types was as follows:

- Native only: Native pasture with minimal presence of introduced species.
- Native + introduced legume: native pasture with a significant presence of introduced legume.
- Native + introduced grass: Native pasture with a significant presence of introduced grass.
- Introduced grass: native pasture replaced by introduced (or naturalised) grass.
- Introduced legume: native pasture replaced by introduced (or naturalised) legume.
- Introduced grass and legume: native pasture replaced by introduced (or naturalised) grass and legume.

A “significant presence” was defined as >10% of the pasture material. Forage crops (such as forage sorghum) were treated as “Introduced grass” and forage legumes (such as *Lablab purpureus*) were treated as “Introduced legume”. This classification was used in a small number of instances. In these conditions cattle often had access to neighbouring pasture.

Genotype classification

Questions 56-59 deal with the breeds present in herds. Due to the great variety of breeds available to cattle breeders we have classified breeds into breed families as outlined in Table 3.

Due to the logistical problems of keeping records of individual animal genotypes in extensive herds, actual numbers of particular genotypes were not ascertained. Therefore, we were able to collect information only on what genotypes and their crosses were present within individual herds. Crossbreeding was common so an effort was made to differentiate between the presence of pure bred and crossbred cattle. Crossbreeding was defined as the planned or unplanned mating of dissimilar breeds of cattle either within or between breed families which can also accommodate upgrading.

Table 3. Descriptions of breed families used to classify genotypes.

Breed family	Description
<i>Bos indicus</i>	African and Indian humped cattle (such as Boran and Brahman). Cattle with $\frac{3}{4}$ or more <i>Bos indicus</i> content were classified into this category. It includes the crosses between <i>Bos indicus</i> and Taurindicus breeds.
<i>Bos taurus</i> (British)	Various British breeds. Cattle with $\frac{3}{4}$ or more British <i>Bos taurus</i> content were classified into this category. The Wagyu breed was classified under this category due to its origins and development.
<i>Bos taurus</i> (European)	Various large European breeds. Cattle with $\frac{3}{4}$ or more European <i>Bos taurus</i> content were classified into this category.
Taurindicus	Various stabilised crosses between the <i>Bos indicus</i> and <i>Bos taurus</i> breeds (e.g. Braford, Brangus, Droughtmaster, Santa Gertrudis).
Tropical <i>Bos taurus</i>	Sanga (African) <i>Bos taurus</i> breeds (Africander, Tuli) and composite breeds derived from them (Belmont Red, Bonsmara). This category was also used to accommodate the Belmont Adaptaur (a stabilised parasite resistant Hereford x Shorthorn composite).
<i>Bos indicus</i> cross	Various unstabilised crosses made using <i>Bos indicus</i> . This category was designed to handle the large number of crossbred cattle of between $\frac{3}{8}$ and $\frac{5}{8}$ <i>Bos indicus</i> content.
<i>Bos taurus</i> cross	Various unstabilised crosses between British and/or European breeds.

While this classification of individual breeds, particularly composites, may not satisfy purists it was developed with the understanding that when classifying animals into breed families it is quite possible for composites of different breeding to belong to quite different breed families. This classification system was also used at a time when interest in composite breeds was growing and we expected find few composite herds. We defined a composite as a stabilised cross between two or more breeds.

Market description

The definitions of the various market classifications are outlined in Table 4. The market structure of the enterprise was determined by analysing the record of sales for the 1991/2 to 1995/6 financial years for the enterprise. Producers are supplied with feedback sheets for cattle slaughtered at meatworks. These feedback sheets provide information on the numbers killed, carcass weight, fat depth, dentition (age) and grading of cattle to market specifications (AUS-MEAT[®]) (Allerton 1999). Cattle sold through sale yards or to the live export trade are generally weighed and such data are often presented on sale documentation. The market aspirations of producers were also determined.

Table 4. Market classification and description.

Market	Description
Domestic	Carcasses that graded to supply local trade and supermarket specifications.
European	Carcasses that graded to specifications to supply the EEC (now EU) market.
Korean	Carcasses that graded to specifications to supply the Korean market.
Live Export	Live cattle that were sold either unfinished or finished for use in markets overseas.
Restaurant	Carcasses that graded to specifications to supply the local restaurant trade.
Japanese	Carcasses that graded to specifications to supply the Japanese market.
Store	Cattle sold in an unfinished condition to be grown and/or fattened or used for breeding elsewhere within Australia.
USA	Carcasses that graded to specifications to supply the USA (manufacturing) beef market.
Seedstock	Elite stock sold for use in herd breeding programs from either registered studs or nucleus breeding herds.
Other	Accommodates various less important market categories.

Survey design validation

The survey was designed and then tested with a small regionally diverse group (n=24) of producers and research station managers prior to revision. Once the revision was made the survey was used with the wider survey group.

Some questions included in the survey were the same as or slightly modified from particular questions in O'Rourke et al. (1992) to examine changes in practices and performance since that survey.

The survey

The section below contains the survey questions (bold font) with the explanatory notes (text boxes) used by the survey team to ensure a uniform interpretation of questions by producers. The notes indicate what information was being sought by asking the question and explanations of what some categories mean. The response lists presented were not exhaustive.

Conducting the surveys face to face gave us a chance to inspect first hand the pasture communities and the presence of introduced species when travelling to the homestead. Invariably, producers would want to show members of the survey team around their properties. This increased the opportunity for viewing the pasture communities and the herd and discussing issues covered in the survey.

Northern Australian Survey Activity

Section 1: General Property Information

Note: The lists provided with each question are not exhaustive lists. Record what “Other” is.

This section provides information assisting with the classification of survey properties in terms of their location, size, herd size, total rainfall etc. Information for identification and future contact is collected.

Property/Station Name:

Owner/Manager Name:

1. Where is your property located?

- **Local Government Authority:**
- **Latitude & Longitude (if known):**
- **Description (e.g. 40km NW of Mt Isa):**

This information is to accurately record sampling locations and data for possible future analysis. Use a GPS to determine the latitude and longitude of the property. Make the measurement at the homestead, if possible. If not available, use appropriate maps. At this point in the survey, check if there are additional properties that are run with the survey property. Determine how these properties fit together as management units. If properties are run as one management unit then, record the combined areas and herd sizes.

2. What is the area of your property?

What % of the property is currently utilised?

What % of the property can be potentially utilised?

Record the property area and the percentage of the property that is currently used and what can potentially be used. This helps indicate areas of northern Australian that have not fully utilised the land area. This information will also be useful for completing Q12-16.

3. How many breeders and bulls does the property run on average?

Breeders: _____ Bulls: _____ Head OR Bull % _____

Record the number of breeders (or joined females) for the property and the number of bulls. If the number of bulls is not known, use bull % instead for calculating number. Record both number and percent if both known. Use the average for the last 5 years if numbers have been unstable.

4. How many head are carried on the property on average?

Record the total number of branded cattle carried on the property. This will give an indication of the stocking rates properties use. Use the average for the last 5 years if numbers have been unstable.

5. Do you keep daily rainfall records? _____ Since when? _____

This provides an indication of record keeping and also assists with answering Q6 and Q61.

6. What is the average annual rainfall recorded for your property?

This follows on from Q5. This information will assist with classification of the property.

7. How many paddocks do you have?

This includes both main and holding paddocks. It gives an idea of the level of infrastructure development on properties. This information may play a role in the classification of the property.

8. What are the beef enterprises carried out on this property? (You may tick more than one)

- | | |
|--|---|
| <input type="checkbox"/> Stud breeding/Seedstock | <input type="checkbox"/> Buying & finishing stores on pasture |
| <input type="checkbox"/> Backgrounding | <input type="checkbox"/> Buying & finishing stores on crop |
| <input type="checkbox"/> Breeding stores | <input type="checkbox"/> Buying & finishing stores in feedlot |
| <input type="checkbox"/> Breeding & finishing on pasture | <input type="checkbox"/> Live cattle export |
| <input type="checkbox"/> Breeding & finishing on crop | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Breeding & finishing in feedlot | |

The definitions of these activities have been discussed above. This question is designed to give an indication of what enterprises are conducted in various regions.

9. Is this property run in conjunction with another beef property(s)?

- No. Yes

If Yes, where are these properties?

What are the enterprises conducted on this/these other properties? (You may tick more than one)

- | | |
|--|---|
| <input type="checkbox"/> Stud breeding/Seedstock | <input type="checkbox"/> Buying & finishing stores on pasture |
| <input type="checkbox"/> Backgrounding | <input type="checkbox"/> Buying & finishing stores on crop |
| <input type="checkbox"/> Breeding stores | <input type="checkbox"/> Buying & finishing stores in feedlot |
| <input type="checkbox"/> Breeding & finishing on pasture | <input type="checkbox"/> Live cattle export |
| <input type="checkbox"/> Breeding & finishing on crop | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Breeding & finishing in feedlot | |

If this property is run in conjunction with another, is it part of a:

- | | |
|---|---|
| <input type="checkbox"/> Family business structure? | <input type="checkbox"/> Producer alliance? |
| <input type="checkbox"/> Corporate structure? | <input type="checkbox"/> Other: _____ |

This section has been discussed above (business structure and property ownership). This question is designed to give an indication of what enterprises are conducted in various regions. Even if the additional property is run as an integral part of the subject property, acknowledge that there is an additional property. Note its location, what production activities are conducted and the structure under which it is managed. This question is designed to get an idea of cattle movements and the relationships between properties and regions.

All questions from this point onwards refer to the property listed in QUESTION 1 and any properties run as one unit.

10. Do you buy stores to fatten on your property?

- Always Never
 Sometimes

What age of animal do you normally buy? (You may tick more than one)

- up to 1 year old 3-4 years old
 1-2 years old 4 + years
 2-3 years old

What age of animal would you prefer to buy? (You may tick more than one)

- up to 1 year old 3-4 years old
 1-2 years old 4 + years
 2-3 years old

The purchase and transfer of store cattle is an integral part of the beef industry. We are interested in what ages of cattle are currently being sourced compared with what is actually preferred. This will provide information concerning potential market opportunities for store cattle of various classes. This information is for the property described in Question 1. Information is sought on what types of animals are presently purchased and what are preferred in order to target the markets the property is interested in or already services.

11. What nutrient deficiencies affecting animal production do you know that exist on your property? (You may tick more than one)

- Calcium Protein/Nitrogen
 Cobalt Salt (Sodium)
 Copper Sulfur
 Phosphorus Other _____

This question is concerned about what nutrient deficiency(s) producers perceive to be affecting their herds. Ask about what supplementary elements they are feeding.

Q12-16 Soil-Vegetation Associations (pasture communities) found on the property(s).

This section is set up to link production attributes to soil-vegetation associations (pasture communities). These data are used to classify the pasture communities into the Tothill and Gillies (1992) system as outlined above.

12. What are the major soil types on your property?	13. On these soils what are the major tree species?	14. On these soils what are the major pasture species?	15. % of property?	16. Stocking rate?
a)				
b)				
c)				
d)				

12. What are the major soil types on your property?

Producers may not always be confident about how soils might be classified. For practical purposes soils can be called by their common names if need be (e.g. scrub soils, Brigalow soils, Ashy Downs etc...). Distinguish between an earth and a duplex if possible. To help with soil classification, producers were asked about the colour and texture of soils removed from fence postholes on the various country types.

13. On these soils what are the major tree species?

What are the dominant tree types present on this soil type? Major vegetation types are associated with soil types in the regions. (e.g. Brigalow-Dawson gum, Mulga, Gidgee).

14. On these soils what are the major pasture species?

What are the dominant native and/or improved grasses and other plant species present? (e.g. Black speargrass, Mitchell grass, Buffel and Seca). If there are discrete areas of improved pasture, these were added as a separate entry. The level of pasture improvement is ascertained in mixed associations.

15. % of property?

On an area basis, calculate or estimate with the producer what percent of the property is covered by this particular soil-vegetation type. This helps give an idea of the importance of this pasture community. Many producers now have satellite images or property maps which show vegetation types.

16. Stocking rate?

This question is intended to get an indication of the stocking rates in use in particular regions on various pasture communities.

Most paddocks are heterogeneous mixes of pasture communities. It is difficult to assign a stocking rate to a discrete community.

Section 2: Pasture Management and Development

This section covers a range of issues concerning the development of property infrastructure, pasture management, pasture improvement and the state of the pasture resource base. The questions are aimed at determining the amount of property development that has taken place since the early 1990s.

17. Have you increased the number of waters on your property over the last 5 years?

- No Yes

This question is one of a series assessing the rate of property infrastructure development since previous surveys. The development of waters often occurs in conjunction with fencing and the sowing/introduction of pasture species.

18. Have you carried out any fencing over the last 5 years? (You may tick more than one)

- No Yes. Associated with new waters. If so, see below. Yes. Not associated with new waters. If so, see below.

This additional fencing has been used to: (You may tick more than one)

- Create a new paddock Fence out a problem area
 Build a new lane Other: _____

This question follows on from Q17 and continues to examine how much and what development activity is taking place. It indicates what fencing activity has been carried out and for what purposes.

19. Have you planned any fencing for the future?

- No Yes. If so, see below.
- If Yes, what have you planned to do? Fence out problem areas
 Create a new holding paddock Build lane ways
 Create a new main paddock Replace old fence
 Fence out certain country types Other: _____

This question examines what development activities are planned for the future. Given the extension effort over the last decade we are interested to see if fencing is being planned to segregate various country types for better management of country types.

20. How do you rate the condition of your pastures? (Place “X” in box of choice)

Pasture Condition	Very Poor	Poor	Average	Good	Very Good
Soil type a					
Soil type b					
Soil type c					
Soil type d					
Soil type e					
Soil type f					

Use the soil types in Q12. Explain to participants what is meant by “condition” (i.e. it is botanically and soil condition based). We classify “very good” as being pristine or virtually undisturbed while “poor” indicates a significant level of degradation (e.g. erosion, weeds etc.). This question is aimed at determining the producer’s perception of the state of the various land units on the property. Rating marks on the line separators are allowed to indicate intermediate classifications. The responses will be coded in the database on a 1-5 scale (1 = very poor; 5 = very good) with 0.5 units to indicate the intermediate classification.

21. Do you have any areas on your property which are salted, eroded or infested or dominated by undesirable weeds?

- No Yes

If yes, on which soil types are these areas?

- All soil types Soil type d
 Soil type a Soil type e
 Soil type b Soil type f
 Soil type c None

This question cross-references with Q20 to double check which particular soil types are degraded.

22. How do you determine stocking rate?

- Set stock (e.g. 1 beast to 12 ha)
 Eye & Experience
 Calculate stocking rate at the end of growing season using a particular utilisation rate
 Carry sufficient stock to meet income requirements
 Other: _____

What methods do producers use to determine stocking rate? Multiple responses are permitted. Given the extension efforts over the last 5 to 10 years, have certain practices been adopted in the grazing management in northern Australia. “Calculate stocking rate at the end of growing season using a particular utilisation rate” is a category intended to check if objective stocking tools which rely on a utilisation rate and available forage assessment to calculate carrying capacity are being used. The 4th point could be interpreted in 2 ways: Either just sufficient to meet living requirements or push the system the hardest to reduce financial pressure. Ask respondents to this one about the reason. Define “utilisation rate” to participants.

23. Do you preferentially graze or spell different paddocks?

- No Yes

24. Do you currently manage areas to encourage pasture regeneration?

- No Yes

We are interested in how widespread pasture spelling is at present. These questions explore the attitude and perceptions of graziers to natural resource management. Are paddocks rested at any particular time for pasture regeneration? This can also accommodate the turning off of watering points in larger paddocks to discourage grazing in those areas.

25. Do land management issues affect your basic management planning?

If Yes, please describe in what way?

- No Yes

This question seeks how land management issues (such as the damage caused by over stocking on pasture health, weed invasion, erosion etc.) affect the management planning and philosophy of the property. How do they address these issues? (The responses are later clustered into theme categories.)

26. What is your policy on the use of fire?

- Do not burn Reduce rank pasture material
 Control woody weeds Reduce fire risk
 Control undesirable pasture species For grazing management
 Encourage improved pasture species Other: _____

How do producers use fire in their particular environment? How is it used in pasture/grazing management in regions? "For grazing management" is intended for the practice of burning to concentrate livestock for mustering etc.

27. What pasture development strategies do you use?

- Pull trees/vegetation & use native pasture
 Pull trees/vegetation & sow improved grasses
 Pull trees/vegetation & sow improved grasses & legumes
 Poison trees/vegetation & use native pasture
 Poison trees/vegetation & sow improved grasses
 Poison trees/vegetation & sow improved grasses & legumes
 Sow improved grasses under timber
 Sow improved legumes under timber
 Sow improved grasses and legumes under timber
 Blade plough only
 Blade plough & sow improved grasses
 Blade plough & sow improved grasses & legumes

- Fertiliser**
- Other:**_____

This question is concerned about what pasture development activities have been used in various regions of northern Australia. Areas developed are not recorded or sought due to the contentious tree clearing guidelines, legislation and greenhouse debate concerning reducing tree clearing causing considerable disquiet and resistance within the farming sector.

28. How long ago was the most recent pasture development carried out?

- This year**
- 2 years ago**
- 4 years ago**
- 1 year ago**
- 3 years ago**
- 5 years ago or more**

We are interested in how long ago the most recent pasture development work was carried out to assess the level of activity of pasture development.

29. If pasture improvement has been carried out, what pasture species have been used?

Legumes:

- Caribbean Stylo/Verano/Amiga**
- Centro**
- Common Stylo**
- Desmanthus**
- Glenn Joint Vetch**
- Leucaena**
- Round Leaf Cassia/Wynn Cassia**
- Seca or Shrubby Stylo/Siran**
- Siratro**
- Other:**_____

Grasses:

- Aleman grass**
- Bambatsi grass**
- Birdwood grass**
- Buffel grass**
- Creeping Blue grass**
- Gamba grass**
- Green panic**
- Guinea/Hamil grass**
- Humidicola/Koronivia grass**
- Hymenachne**
- Para grass**
- Purple pigeon grass**
- Rhodes grass**
- Sabi grass**
- Setaria**
- Signal grass**
- Silk Sorghum**
- Other:**_____

This question determines the array of pasture species that are or have been used in pasture sowing programs in the various regions. This feeds into Q30 concerning success of such introductions.

30. Are any useful introduced pasture species spreading naturally on your property? If so, which ones?

Of the species that have been introduced are any spreading naturally? This is aimed at determining the suitability of certain environments for particular species using local knowledge. This may allow a fine-tuning of recommendations concerning various species.

31. Are woody weeds a problem on the property?

- No Yes. If yes, Which ones?

Exotic:

- Prickly Acacia
 Parkinsonia
 Mesquite
 Rubber vine
 Chinee Apple
 Other: _____

Native:

- Brigalow regrowth
 Eucalypt regrowth
 Currant Bush
 Wattle
 Other: _____

What woody weeds are causing problems in what regions of northern Australia? Where? Are natives or exotics more of a problem?

32. Do you control any of the following pests?

- Pigs Donkeys Other: _____
 Buffalo Camels
 Feral horses Kangaroos

This question is aimed at determining not only the control of **total grazing pressure** on the property but also what species producers perceive to be a problem.

Although not herbivores, dingoes and foxes were also nominated by participants.

Section 3: Herd Management & Performance

This section deals with the management and performance of the northern Australian beef herd. Many questions rely on business records. These questions also allow a comparison of management practice changes since previous surveys such as O'Rourke *et al.* (1992).

**33. How many branded cattle would you carry during the following types of seasons?
(State numbers at end of March)**

Class of Cattle	Poor season	Average season	Good season
Calves			
Weaners			
1 year old Heifers			
2 year old Heifers			
3-5 year old Cows			
6-9 year old Cows			
10+ year old Cows			
1 year old Steers			
2 year old Steers			
3 year old Bullocks			
4 year old Bullocks			
5+ year old Bullocks			
Bulls			
Spayed Cows			
Total Cattle			

Q3 and Q4 gave a prelude to what cattle numbers should look like on average. This question is concerned about how numbers and herd structure change with seasonal conditions. This information may prove helpful with modelling scenarios. "Poor season" can be used to record what a droughted property herd structure and numbers might look like. In many cases it may not be known how many cattle (e.g. breeders) there are. In such cases, if breeders are females 3-9 years of age place a bar down the side of the column and record the total number carried. Previous records will provide insights into this.

34. During which months do you mate your breeders? (Mark active months with "X" or X----X)

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

During which months do a majority of calves seem to drop?

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

We are interested in the joining practices used in the various regions of northern Australia. How widespread has controlled mating become and in what regions? Various regions reported two calving peaks occurring due to poor seasonal conditions and unseasonal rain. This question will assist with investigating this situation. This section is also intended to examine the mating practices across regions and how calving patterns are affected. Rainfall patterns are characterised for much of northern Australia so this can also be examined in relation to the calving pattern. This question also assists with the questions asked later about weaning practices.

35. Do you pregnancy test your females?

- No Yes. If so which ones?

If you pregnancy test, which classes of females are tested?

- Heifers only Both Heifers & Breeders
 Breeders only Other: _____

Pregnancy testing/diagnosis is becoming a more widespread and adopted practice in beef herds. What is not certain is just how widespread its use is across regions and within herds. The categories “Heifers only”, “Breeders only” and “Both Heifers & Breeders” are for herds that pregnancy test all these classes. In some cases only one of these classes may be tested. However, in the case of selective testing (e.g. Dry or “suspicious looking females”) record these classes under “Other” and make note of them. Such information may also prove useful if we need to go back into regions to get more detailed data on reproduction in these regions.

36. Do you separate calves from their mothers (wean)?

- No Yes? If so, see below for details.

The northern Australian herds have shown an increase in weaning and adopting early weaning practices in particular. This series of questions concerning weaning practice is intended to provide us with a picture of how lactation stress varies between regional herds (weaning age and timing) as well as how weaning is used as a management tool. Does the practice vary across and within regions?

How many weaning rounds do you have?

- None 3 rounds
 1 round 4 rounds
 2 rounds 5 or more

During which months do you wean?

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Note which months weaning occurs in by checking the appropriate box as for Q34. This information will assist with estimating the average age of weaners when combined with responses to Q34.

If so, down to what age do you wean?

- | | | |
|-----------------------------------|-----------------------------------|---|
| <input type="checkbox"/> 1 month | <input type="checkbox"/> 4 months | <input type="checkbox"/> 7 months |
| <input type="checkbox"/> 2 months | <input type="checkbox"/> 5 months | <input type="checkbox"/> 8 months |
| <input type="checkbox"/> 3 months | <input type="checkbox"/> 6 months | <input type="checkbox"/> 9 months and older |

What would the average age of these weaners be? _____

What would the average liveweight of the weaners be? _____

Weaning ages (minimum and average) can be cross-checked by using the calving information from Q34. This question further contributes to the picture of weaning practices across and within northern Australian regions.

Most producers are weighing cattle and taking an interest in what cattle of various ages weigh. In the absence of such data, use the liveweight information from sales documents where weaners have been sold as an indication.

Note: It is important to obtain credible answers for this section since it has considerable influence on the annual liveweight gain calculations in Q64 in this survey. Check the average age provided against the responses for calf drop (Q34) and reconcile with the weaning months above. If in doubt, see if it is possible to view some weaners.

37. In poor seasons, do you wean earlier than normal?

- No Yes

If Yes, how much earlier?

- | | | |
|-----------------------------------|-----------------------------------|---|
| <input type="checkbox"/> 1 month | <input type="checkbox"/> 3 months | <input type="checkbox"/> 5 months |
| <input type="checkbox"/> 2 months | <input type="checkbox"/> 4 months | <input type="checkbox"/> 6 months or more |

What would the average liveweight of the weaners be? _____

Does a change in seasonal conditions affect weaning practices in northern Australia? This question examines if weaning policy changes with poor seasonal conditions and the use of early weaning as a tool for drought management of breeder herds to reduce stress on breeding females. What is carried out where? Record liveweight of weaners if known.

38. Do you plan to change your age of turn-off in the next 5 years?

- No change Yes - older Yes - younger

This question is a "primer" question for a later question Q55, which deals with planned future changes to boost profitability. Be sure to refer back to this question to check for consistency of response.

39. Are any classes of animals in the herd segregated from the rest of the herd at any time?

- No Yes

If Yes, which ones?

- Bulls Steers/Bullocks
 Heifers Weaners
 Other: _____

This question is mainly interested in how different classes of cattle are treated within the herd. When compared with other surveys, it is trying to pick up on improvements in management in the northern herd. This question will also give insights into the potential for preferential treatment for certain types of cattle if they are segregated from the herd (e.g. heifers). It also double checks Q34 by asking if bulls are segregated and is an advance check on heifer joining practice (Q52 and Q53).

40. Do you generally use rumen modifiers on your cattle?

- No Yes. If Yes, see below.

If Yes, in what classes of stock?

- Breeders Steers & Bullocks
 Calves Weaners
 Heifers Other _____

Do cattle have access to rumen modifiers? This question is aimed at looking at the use of rumen modifiers within the herd and seeing if certain classes of livestock are targeted for their use (e.g. weaners) which may give them an advantage or reduce nutritional stress. Care is required with this question. Urea is not classified as a rumen modifier. Be sure to check if calf pellets are fed, or if molasses/grain supplements or feeding (with additives) is used for various classes of cattle. If possible ask to see product labels to check composition. Many of these products contain rumen modifiers such as Rumensin® or Avotan®.

41. Do you generally use Hormonal Growth Promotants (HGP) on your cattle?

- No. Go to Q 44. Yes. If Yes, see next question.

This question explores the use of HGPs in the northern Australian herd. There is evidence that particular regions use HGPs more readily than others. There is also the question if particular regions are using them to target particular markets as a part of their management program for the herd. Conversely, are certain regions not using HGPs since they readily have access to certain markets that ban their use in cattle?

42. Which classes of stock are implanted? (Place the age of implantation (months) in the box of your choice)

Class of Stock	Age HGP Implanted
Calves	
Weaners	
Heifers	
Steers	
Bullocks	
Cull Breeders	
Other:	

If HGPs are used, we are interested in what ages and classes of cattle are implanted. If only certain sexes of weaners are implanted record these under the respective sex categories or under "Other" if space is limited. This question will also give insights into the use of multiple implants (e.g. implant as weaner and then again as a bullock)?

43. What % growth advantage does implantation provide your cattle over unimplanted cattle?

- 0% 10-15% 25-30%
 0-5% 15-20% Greater than 30%
 5-10% 20-25%

This question examines producer perceptions or measurements of what advantage they are obtaining in their environment by using HGP implants. If they don't know leave it blank. This question gives an insight into whether or not they weigh cattle or have records of liveweights. Useful to know for Q63 and Q64. If they respond ask how do they know to confirm liveweight records.

44. Do you keep stock records?

- No. Yes. See below.

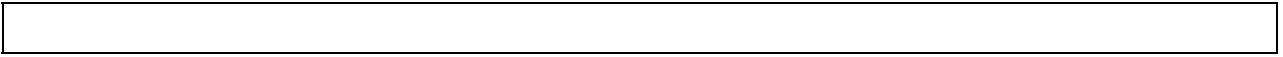
If Yes, what kind?

- Stock numbers Paddock records
 Sales Supplement records
 Brandings Other: _____

This question gives us an insight into what records are available to complete future questions. This question is also useful in case future work requires us to gather additional information. Responses to this question will help us quickly identify producers with records we may be interested in.

An example of "Paddock records" is numbers of cattle taken in and out of paddocks being recorded.

If various beef production activities such as "seedstock/stud breeding" are conducted (Q8 and Q9) be sure to ask about what records are associated with this activity.



45. Do you feed these supplements? When? And to which class of livestock? (Place an “X” in month of activity and class of stock) If months of supplement offering are different for different classes of stock, place month period in class of stock box (e.g. Heifers: Jul-N, Breeders: Apr-Nov)

Supplement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Weaners	Heifers	Steers	Breeders	Bulls	
P supplement only																		
Molasses-urea																		
Molasses-urea-P																		
Molasses-urea-protein meal																		
Molasses-urea-protein meal-P																		
Salt-protein meal-urea- S																		
Salt-urea																		
Salt-urea-P																		
Salt-urea-sulfate of ammonia																		
Salt-urea-sulfate of ammonia-P																		
Protein meal																		
Whole cottonseed																		
Grain																		
Crop:																		
Proprietary Blocks: Name:																		
Proprietary Mixes: Name:																		
Other: _____ Mix details on opposite page.																		

This question explores the nutritional management of regional herds. What supplements are being used where in northern Australia? Are they nutritionally appropriate? We are not actively recording quantities consumed but, if available, record this information. If a particular supplement is fed to more than one class of cattle but all in the same series of months, record by marking months and cattle classes. However, if different months for different classes, record months under classes of cattle.

There is a vast array of proprietary blocks and mixes and custom mixes. If possible ask to see product labels to check composition. Record composition on blank page provided and we will classify the product accordingly if need be. “Crop” is included since parts of survey area do have crops that are planted either for direct livestock use or cattle have access to crop residues. The “Grain” category is for feeding grain as a supplement in paddocks or enclosures. If feedlot, record that this category has been used to record a feedlot.

Record custom mixes under “Other”. Be sure to record mix details.

The next 4 questions (Q46 - Q49) concern aspects of herd health: parasites and vaccinations.

Q46 - Q48 are concerned about the treatments applied for internal and external parasites. We are interested in the frequency of such treatments and what classes of cattle are subject to these treatments. These questions are structured such that structured or opportunistic treatments can be recorded. "As required" accommodates the latter practice. This set of questions gives us an idea of when certain parasites are seen to be a problem in northern Australian regions.

Q49 is concerned with what vaccinations are administered to what classes of livestock.

46. Do you treat your cattle for ticks?

- No** **Yes. If Yes see below for details required**

When? (Mark months with an "X")

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

How often?

_____Days _____Weeks OR As Required.

Which classes of livestock?

- Calves Heifers Breeders
 Weaners Steers Bulls

47. Do you treat your cattle for worms?

- No** **Yes. If Yes see below for details required**

When? (Mark months with an "X")

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

How often?

_____Days _____Weeks OR As Required.

Which classes of livestock?

- Calves Heifers Breeders
 Weaners Steers Bulls

48. Do you treat your cattle for Buffalo Fly?

- No** **Yes. If Yes see below for details required.**

When? (Mark months with an "X")

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

How often?

_____ Days _____ Weeks OR As Required.

Which classes of livestock?

- Calves Heifers Breeders
 Weaners Steers Bulls

49. Do you vaccinate to control any of the following diseases? (Place an X in the box of choice)

Disease	Calves	Weaners	Heifers	Steers Bullocks	Bulls	Breeders
Tick fever						
3 Day Sickness/Ephemeral fever						
Botulism						
Diseases covered by 5 in 1						
Lepto						
Vibrio						

50. What are your main preferred criteria that you select bulls on for use in your herd?

- Breedplan** **Structural soundness only**
 Breedplan only **Temperament**
 Colour **Weight for age/Performance ratios**
 Conformation only **Other** _____
 Serving capacity

This question examines the practices and attitudes of producers to bull buying and genetic improvement. We are interested in how widespread objective selection of bulls is in northern Australia and if there were any problems. If problems are experienced, record these in the margin of the survey form. In some cases Breedplan is not well known or understood so examples of Breedplan may have to be illustrated. "Breedplan only" is used where a strict selection on objective records is used. Serving capacity can also embrace "ability to serve".

51. What are your culling practices for Cows and Bulls?

Cows:

- Temperament
- Disease
- Age
- Fat
- Physical defects/Conformation
- Failure to get pregnant
- Failure to rear a calf
- Out of season pregnancy
- Poor quality/performing calves
- Do not cull
- Other: _____

Bulls:

- Temperament
- Disease
- Age
- Physical defects/Conformation
- Reproductive problems
- Poor quality/performing calves
- Do not cull
- Other: _____

At what age are Cows normally culled?

- less than 5 years old
- 6 - 8 years old
- 9 years old
- 10 years old
- 11 years old
- 12 years old or over
- Don't cull

At what age are Bulls normally culled?

- 1 year old
- 2 years old
- 3 years old
- 4 years old
- 5 years old
- 6 years old
- 7 years old
- 8 years old
- 9 years old
- 10 years or over
- Don't cull

We are interested in the culling policies that producers apply to cows and bulls in their herds. Heifers are dealt with in the following questions. Failure to get pregnant can be equated to a negative pregnancy test although many "visually pregnancy test". For bulls, "reproductive problems" includes damaged genitals or inability to serve due to physical problems. We are also interested in differences between herds in maximum culling age for males and females. More than one response is permissible.

52. At what age do heifers enter the breeder herd?

- Not removed
- 1 -2 year old
- 2 -3 year old
- 3 + years old

This question when combined with Q53 will give an indication of how widespread the practice of segregated joining of heifers is. This question is trying to ascertain when the heifers are actually placed with the breeder herd.

53. At what age do your heifers first calve?

- 2 -3 years old 3 -4 years old 4 + years old

We are interested in regional variations in the age that heifers are first joined and hence calve. This question will highlight areas for improvement and gives us an idea of the reproductive shortcomings of regional breeder herds.

54. At what age are heifers culled?

- Weaner 2 years old Do not cull
 1 year old 3 years old

What % of heifers are retained for the breeding herd? _____%

Reasons for culling:

- | | |
|--|--|
| <input type="checkbox"/> Temperament | <input type="checkbox"/> Disease |
| <input type="checkbox"/> Poor liveweight performance | <input type="checkbox"/> Poor quality calf |
| <input type="checkbox"/> Physical defects/conformation | <input type="checkbox"/> Don't cull |
| <input type="checkbox"/> Failure to get pregnant | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Failure to rear a calf | |

This question is about the culling events heifers are subjected to, what culling criteria are used and what proportion of heifers end up entering the breeding herd. This data may be of assistance with any modelling work that is conducted.

55. Over the next 5 years what are you going to change to increase or boost profitability?

- | | | |
|--|---|--|
| <input type="checkbox"/> Make no changes | <input type="checkbox"/> Herd size | <input type="checkbox"/> Pasture improvement |
| <input type="checkbox"/> Target markets | <input type="checkbox"/> Reduce death rate | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Reduce turn-off age | <input type="checkbox"/> Increase branding rate | |
| <input type="checkbox"/> Increase turn-off age | <input type="checkbox"/> Increase turn-off weight | |
| <input type="checkbox"/> Herd structure | <input type="checkbox"/> Pasture management | |

The industry had experienced variable seasonal and market conditions since the early 1990s that have caused both stress and prosperity. Good cattle prices from the live export markets have brought a lot of money into regions that previously have not enjoyed premium returns for their cattle. With the increased money flowing into the industry and recognition by many for a need to change, we are interested in what aspiration producers have to improve their profitability over the next 5 years.

This question does not deal with the specifics of proposed changes, just general areas of interest. Some of these categories are not areas that can be directly controlled by producers. Many of these involve the implementation of a range of management strategies. However, this information will be useful to the many extension and research staff servicing the northern Australian beef industry since it will give an idea of the intended future direction of industry activity and what production issues producers see as important.

This question is also structured to examine the balance (or conflict) between certain nominated changes. For example, in decreasing turn-off age certain other changes such as increasing branding rate or change herd structure will have to be nominated. Do not prompt, it is their response patterns that we are interested in. This question will to a certain extent provide a warning to those servicing the industry of pending problems due to the downstream effects of various changes being overlooked.

Some explanations of the above categories:

“Make no changes” is counted as a valid response since we are interested in the proportion of producers who see no need to change.

“Pasture management” covers the reduction of grazing pressure, change in grazing practices, use of fire etc...

“Pasture improvement” is the sowing of introduced species. This includes increasing existing areas.

“Target markets” is concerned with targeting different markets. It can accommodate shifts within market categories.

Be sure to check turn-off age responses with Q38.

56. What are your current breed(s) of bulls?

***Bos indicus* types**

- Boran
- Brahman
- Gir
- Indu Brazil
- Red Sindhi
- Sahiwal

Composite/Tropical (*Taurindicus*) types

- Braford
- Brangus
- Charbray
- Droughtmaster
- Santa Gertrudis
- Other: _____

European (*Bos taurus*) types

- Blonde d'Aquitaine
- Charolais
- Chianina
- Gelbveih
- Limousin
- Romagnola
- Saler
- Simmental
- Other: _____

Tropical *Bos taurus* types

- Adaptaur
- Africander
- Belmont Red
- Tuli (Sanga type)

British (*Bos taurus*) types

- Angus
- Devon
- Hereford (includes Poll)
- Murray Grey
- Shorthorn (includes Poll)
- South Devon
- Other: _____

Other (*Bos taurus*) types

- Waygu

Other Breed:

We are interested if there are particular genotypes more suited or more widely used in particular regions. This question also includes the use of AI sires in the breeding herd. This question combined with the following questions on current female genotypes will give a picture of the future direction of the genetic base of the northern Australian beef herd. This is because female genotypes derived from the current combinations of male and female genotypes would be expected to exist in the herd for at least 6-10 years.

The breeds of bulls are presented in breed family lists. Select from these breeds to indicate what bulls are currently in use in the breeding herd. Provision has been made for an extra entry just in case a particular breed may have been overlooked in each breed family. When recording the use of crossbred bulls, be sure to put the sire breed first.

As outlined in a preceding section these will be classified into Breed Families for reporting purposes. A composite is defined as a stabilised cross of two or more breeds. Most of the northern herd is based on *Bos indicus*, the composite classification is listed under the Tropical (*Taurindicus*) types since it is expected that most will be close to these breeds in *Bos indicus* content. Be sure, however, to record the breeding or breed proportions in any composites or cross bred to aid classification into breed families. Some members (e.g. Belmont Red) Tropical *Bos taurus* cattle family are by definition composites but for these purposes breed family membership is more important.

"Other Breed" should be recorded. It is a category intended for any exotic preferences producers may have.

57. What are your current breed(s) of cows?

- **What is your desired breed of cow(s)?**

- **Composite:** _____

This is for the producer if nominating composite to put the bred mix in or actual breed.

This section dealt with the current female genotypes in use in the breeder herd. It also helped confirm some of the genotype use in the next question that tracks the use of various breeds in the herd over time.

It would be best to record the most common breed in the herd first although the producer will often do this anyway. Due to the recognised difficulties of record keeping in extensive herds we will not be asking for numbers or proportion of the herd constituted by these breeds/genotypes.

We are also interested in what breeds of female cattle the producer is interested in for the future (desired breed). This is also a check on the direction that the herd is taking compared with what is currently in the herd. Experience has shown that planning and designing crossbreeding programs provide producers with many problems. Are the desired breeds going to cause husbandry problems or opportunities?

When recording the use of crossbred females, be sure to put the sire breed first. Provision has been made for composites. Be sure to record the breed mix of the composite breed. If possible, record the composite breeding plan.

As outlined in a preceding section these will be classified into breed families for reporting purposes.

58. What breeds of bulls have you used in the past?

***Bos indicus* types**

- Boran
- Brahman
- Gir
- Indu Brazil
- Red Sindhi
- Sahiwal

Tropical *Bos taurus* types

- Adaptaur
- Africander
- Belmont Red
- Tuli (Sanga type)

Composite/Tropical (*Taurindicus*) types

- Braford
- Brangus
- Charbray
- Droughtmaster
- Santa Gertrudis
- Other: _____

British (*Bos taurus*) types

- Angus
- Devon
- Hereford (includes Poll)
- Murray Grey
- Shorthorn (includes Poll)
- South Devon
- Other: _____

European (*Bos taurus*) types

- Blonde d'Aquitaine
- Charolais
- Chianina
- Gelbveih
- Limousin
- Romagnola
- Saler
- Simmental
- Other: _____

Other (*Bos taurus*) types

- Waygu
- Other Breed:** _____

When and why did you change?

This question helps confirm the existing female genotypes in the herd as well as giving an insight into the problems experienced with or the benefits of particular breeds. The change component of the question may give an indication of the suitability of certain breeds within regions for markets or productivity attributes. This section also includes the use of AI sires in the breeding herd.

If possible, record the starting female base. When recording the use of crossbred bulls, be sure to put the sire breed first. Record under appropriate breed family. Record breed mix if possible.

59. What do you see as the breed(s) of the future for your herd and property? Why?

<i>Bos indicus</i> types	Why ?
<input type="checkbox"/> Boran	
<input type="checkbox"/> Brahman	
<input type="checkbox"/> Gir	
<input type="checkbox"/> Indu Brazil	
<input type="checkbox"/> Red Sindhi	
<input type="checkbox"/> Sahiwal	
Tropical <i>Bos taurus</i> types	
<input type="checkbox"/> Adaptaur	
<input type="checkbox"/> Africander	
<input type="checkbox"/> Belmont Red	
<input type="checkbox"/> Tuli (Sanga type)	
Composite/Tropical (<i>Taurindicus</i>) types	
<input type="checkbox"/> Braford	
<input type="checkbox"/> Brangus	
<input type="checkbox"/> Charbray	
<input type="checkbox"/> Droughtmaster	
<input type="checkbox"/> Santa Gertrudis	
<input type="checkbox"/> Other:	
British (<i>Bos tuarus</i>) types	
<input type="checkbox"/> Angus	
<input type="checkbox"/> Devon	
<input type="checkbox"/> Hereford (includes Poll)	
<input type="checkbox"/> Murray Grey	
<input type="checkbox"/> Shorthorn (includes Poll)	
<input type="checkbox"/> South Devon	
<input type="checkbox"/> Other:	
European (<i>Bos tuarus</i>) types	
<input type="checkbox"/> Blonde d'Aquitaine	
<input type="checkbox"/> Charolais	
<input type="checkbox"/> Chianina	
<input type="checkbox"/> Gelbveih	
<input type="checkbox"/> Limousin	
<input type="checkbox"/> Romagnola	
<input type="checkbox"/> Saler	
<input type="checkbox"/> Simmental	
<input type="checkbox"/> Other:	

This question is interested in what breeds producers saw being used in their herds and the reasons why (mainly concerning traits). These breeds need not necessarily be in use in the herd. These data are also useful to compare with previous sections to examine the future genetic direction of the northern beef herd. Record the reasons and these will be classified by theme later. This section also includes the use of AI sires in the breeding herd. Be sure to put the sire breed first for crossbred cattle. Record under appropriate breed family. Record breed mix if possible for any composites.

60. Do you have records of annual calving or branding rates/percentages?

No

Yes

What are the branding rates (%) for the various classes of females at joining?

Class of Livestock	Poor seasons	Average seasons	Good seasons
Heifers 2 years old			
Cows 3 - 5 years old			
Cows 6 - 9 years old			
Cows 10+ years old			
Average			

This question is intended to give us an idea of what records are kept and the detail of these records. This question is also useful in case future work requires us to gather additional information. Responses to this question will help us quickly identify producers with records we may be interested in.

If records only cover the whole female herd, place a thick line down the side of the column to indicate that classes have been bulked and no data has been simply missed out. If necessary, this question can be filled out after having completed Q61 and Q62 by using means for seasons. Check with manager about the numbers and how they look.

This information will prove useful for modelling work.

61. Indicate the type of season for the following years. (Place an X in the box of your choice)eaH. If available, please supply details of branding rate and rainfall.

Year	Poor seasons	Average seasons	Good seasons	Branding rate (%)	Rainfall (mm)
1996					
1995					
1994					
1993					
1992					
1991					
1990					
1989					
1988					
1987					

This question will give a long-term picture of how branding rates have changed in the herd. Has the reproductive performance of the survey herd improved over time? If necessary, this question can be filled out after having completed Q62 by using means for seasons. We are attempting to relate seasonal conditions to reproductive performance, which will help with modelling work. Rainfall records serve as a prompt to the producer in recalling what kind of season it was. This question need not include 1996 if data have not been collated. Rating marks on the line separators are allowed.

62. How many joined breeders have you carried over each of the last 5 years and how many of calves were branded?

Year	Number of joined females	Number of calves branded
1991		
1992		
1993		
1994		
1995		
1996		

Indicate if joined one year and calved the next as in control mated herds e.g. 1991/92.

Branding rate is used as a measure of herd reproductive efficiency. Branding rate is calculated on the basis of TOTAL CALVES BRANDED from TOTAL JOINED FEMALES (i.e. total cows and heifers exposed to bulls). This is considered to be the most appropriate means of calculating reproductive efficiency and it is important to have a uniform calculation of the reproductive efficiency of regional herds. Branding rates are calculated for a 5-year period (1991 - 95) to reduce some of the high between-year variation.

Be sure that you are recording total joined females since the methods used by producers to calculate branding rate can be variable and quite innovative.

As with most records based questions, this question is used to identify people that we may wish to refer back to for further information if required.

63. Do you have records of liveweight and liveweight gains of steers/bullocks or heifers?

No **Yes**

This is a record keeping question that gives us a picture of the proportion of producers that actually keep records of liveweights or liveweight gains of their cattle. This also gives us an idea of what we may have to work with for completing the next question (Q64).

This question can also identify people that we may wish to refer back to for further information on how cattle perform in various environments.

Records for this section can be the notebooks that are often carried in top pockets. These often prove to contain a wealth of information but the information source should be noted.

64. What are the average liveweight gains per year obtained from the various country types?

Soil Type	Male Liveweight Gain/yr	Female Liveweight Gain/yr
a		
b		
c		
d		

(Preferably liveweight gain for 12 months following weaning)

This question is aimed at determining male and female liveweight performance on the various pasture communities that exist on the property (from Q12 - Q16).

Ask the producer which pasture communities are used for growing and finishing male and female cattle. If there is more than one pasture community in the paddock, try to ascertain if any communities are favoured more than the others. If so assign the annual liveweight gain to this community. If not, assign it to all communities in that paddock.

The annual liveweight gain can be determined from the records, if available, but this should be double checked when collecting the data for Q71 (and Q72) since this involves recording age and liveweights of cattle for various markets from sale records. Sales records often record the liveweight and age/ year brand of the stock. A minority of producers have records of annual liveweight gain for their properties. However, many producers have collected liveweight data for various ages of cattle, particularly weaner and sale cattle. Weighing cattle on to the truck is becoming common. Transfer the average weaning weight and age from Q36 to the left-hand margin of Q64 to assist with calculations. Using these data calculate annual liveweight gain. An example of the calculation is:

A 30-month steer weighing 550 kg that had been weaned at 6 months at a liveweight of 150 kg.

Annual LWT gain = $(550-150)/(30-6) = 400/24 = 16.67 \text{ kg/month} = 200 \text{ kg/year}$.

If only carcass weights are available, use a standard 55% dressing percentage to determine liveweight. For a 300 kg carcass as an example:

Liveweight = $\text{Carcass weight} / 0.55 = 300 / 0.55 = 545 \text{ kg}$.

Crosscheck calculations with the producer. If available, use age and liveweight data from various markets to check the annual liveweight gain calculation.

The accuracy of this technique has been confirmed using research data from the Belmont Research Station herd that included both weaning and sale/mature liveweights and carcass weights (JE Frisch, unpublished data).

65. What is your annual mortality rate?

Class of Livestock	Good season	Average season	Poor season
Calves			
Weaners			
Heifers 1 year old			
Heifers 2 years old			
Cows 3 - 5 years old: Wet			
Cows 6 - 9 years old: Wet			
Cows 10+ years old: Wet			
Dry Cows			
Steers 1 year old			
Steers 2 years old			
Bullocks 3 years old			
Bullocks 4 years old			
Bullocks 5+ years old			
Bulls			
Spayed Cows			

These data are producer estimates (or can be ascertained from their records). It is intended to collect these data to support modelling work. If records cover only the whole female herd, place a thick line down the side of the column to indicate that classes have been bulked.

66. What is the mortality rate from branding to weaning? _____%

These data are also producer estimates of mortality (or can be ascertained from their records). Branded calves and weaners are often counted so we expect a reasonable degree of accuracy. This question is also looking at where losses within the system may be occurring. Losses between branding and weaning are indicative of stress and husbandry problems.

67. For what market(s) are you aiming to produce cattle?

- | | | |
|---------------------------------------|---|------------------------------------|
| <input type="checkbox"/> Domestic | <input type="checkbox"/> Live Export | <input type="checkbox"/> Store |
| <input type="checkbox"/> European | <input type="checkbox"/> Prime (Restaurant) | <input type="checkbox"/> US |
| <input type="checkbox"/> Korean | <input type="checkbox"/> Japanese | <input type="checkbox"/> Seedstock |
| <input type="checkbox"/> Other: _____ | | |

The definitions of the various market classifications are outlined in Table 4. This question is interested in the market aspirations of producers in the various regions of northern Australia. We acknowledge that there can be differences between what markets producers actually supply and what they wish or plan to supply. We are interested in these differences. This question when compared with Q71 and Q72 will give an idea of these divergences.

68. Do you follow your cattle through to the abattoir?

- No** **Yes. Why? See below:**
- Assess/Plan breeding objectives** **Monitor herd progress/performance**
- Animal selection for sale/markets** **Other: _____**

We are interested in how many beef producers go to see their cattle killed at the abattoir and if they use such information to modify their management and planning? In some cases, such visits to abattoirs are to check on practices or to see where and why various discounts are occurring.

69. Do you value the information from the kill sheets?

- No** **Yes. How? See below:**
- Assess/Plan breeding objectives** **Monitor herd progress/performance**
- Animal selection for sale/markets** **Other: _____**

The feedback sheets ("Kill sheets") are normally sent to producers by the abattoir with carcass information from each animal. We are interested in how producers use such information. Do they use the information to modify their management and planning? In some cases, producers use the kill sheets to see where and why various discounts are occurring.

70. Why do you choose to target a particular market? (You may tick more than one)

- Price/Financial return** **Prestige**
- Suits country & breed mix** **Other: _____**
- Neighbours do it**

This question is something of a light-hearted break to the stream of questions since some of the above categories will provide amusement. It can also serve as a point of discussion to allow a revision of responses to previous questions or to discuss details. It also leads us into the analysis of business records component of the survey.

Total sales and markets:

The next 3 questions (Q71, Q72 and Q73) seek to determine what markets are serviced by which regions of northern Australia. Also, given the rapid growth of the live export markets, and changes to markets and climatic conditions, how has the pattern of markets changed?

The data for these questions are obtained from an integrated collation of the sales records for the business (see Table 4). For each year a tally of sales to markets is recorded. In this process, the market destination, age, liveweight and classes of stock are noted. This exercise also helps refresh the producer's memory about sales and markets.

The markets are detailed in Table 4 in an above section. The markets are ascertained from the sales or meatworks documentation. In the case of sale yard or paddock sales, confirm market destination with the producer. Meatworks market classifications are to be confirmed by feedback sheet or they were classified as having graded to the USA manufacturing market. This is to prevent exaggerated claims about market performance or withholding of records. This happens in only a minority of cases.

The age of the cattle is determined from dentition records on feedback sheets or from brand descriptions on sale documentation.

For Q71, the normal age of sale records the age range and mean age of the cattle to that market. The same recording is also applied to liveweight. The liveweight for slaughter cattle is determined by adjusting the carcass weight for a 55% dressing percentage. However, only the mean for these is recorded in the database.

The age and liveweight information from this exercise provide data to calculate annual liveweight gain (Q64). Age is ultimately only an estimate since accurate determination under rangeland conditions is impossible. However, data collected in Q34 (calving periods), Q35 (weaning events) and sale dates on documents help with the precision of age estimation.

The use of a standard 55% dressing percentage will avoid the confusion associated with different standards for different regions or districts. Use this unless the producer can produce data on their dressing percentage, but this will inevitably involve them also having cattle liveweight data available. If property estimates are used be sure to record on the survey form that this has been done and what dressing percentage was used.

Table 5. An example of the Sales to Markets x Year record table. The boxes indicate the survey question table that the data is placed in.

Year: 1993/4

	Market	Bulls	Steers	Females	Total
Q71 ←	Domestic				
	European				
	Korean				
	Live Export				
	Prime (Restaurant)				
	Japanese				
	Store				
	USA				
	Other:				
	Total				

→ Q72

→ Q73

Transfer appropriate totals from the records to the respective tables on the survey form as indicated by the arrows.

71. At what age do you normally turn off your cattle (and for which markets?)

Market	Normal age of turnoff	Liveweight (kg)	Classes of stock
Domestic			
European			
Korean			
Live Export			
Prime (Restaurant)			
Japanese			
Store			
US			
Other:			

72. Over the last five years what percentage of your sales have gone to the following markets?

Market	1995/6	1994/5	1993/4	1992/3	1991/2
Domestic					
European					
Korean					
Live Export					
Prime (Restaurant)					
Japanese					
Store					
USA					
Other:					

73. Indicate the number of cattle sold (or transferred) from this property in the last 5 years.

Year	Bulls	Steers/Bullocks	Females
1991/2			
1992/3			
1993/4			
1994/5			
1995/6			

This table is a summary of the sales records. This section is to record the sales of males and females and thus determine the male to female sales ratios which gives an indication of female mortality rates.

Note, the survey period saw much opportunistic store cattle buying and since we did not make provisions to record these data we were unable to determine death rates from the male to female sales ratios.

74. Indicate the average age when the following classes of livestock are sold.

Heifers _____

Store Steers _____

Cull Cows _____

Prime Steers/Bullocks _____

Cull Bulls _____

This section is a built in double-check for Q71.

Section 4: Information Management.

This section is concerned about how producers manage and source information and what problems are encountered. Computers are a tool to source and manage information. It is also of interest to determine the current and preferred sources of information of producers, and what information sources have the greatest impact in terms of assisting learning. If required, this information will enable us to tailor our communication plan to the various areas and regions of northern Australia. It is hoped that information delivery can be done in a way that is in tune with the “cultural tone” of the various regions.

Some of the results from this section were published by Bortolussi *et al.* (1999).

75. Do you use a personal computer to assist you in property management?

- No Yes

Use of computer (You may tick more than one):

- | | |
|--|---|
| <input type="checkbox"/> Accounting/Financial record keeping | <input type="checkbox"/> Planning property improvements |
| <input type="checkbox"/> Decision support (e.g. Herd models) | <input type="checkbox"/> Resource mapping |
| <input type="checkbox"/> Education | <input type="checkbox"/> Spreadsheets |
| <input type="checkbox"/> Herd recording | <input type="checkbox"/> Word processing |
| <input type="checkbox"/> Modem/Internet/Electronic mail | <input type="checkbox"/> Other: _____ |

This question is intended to explore the use of computer based technology in farm business management in northern Australia. We are also interested in how computers are used in the business and for what purposes. “Planning property improvements” and “Resource mapping” are categories to examine the use of computer based mapping for planning and building inventories.

76. What are your present sources of property management information? (You may tick more than one)

- | | |
|--|---|
| <input type="checkbox"/> Advisor/consultant (face to face/phone) | <input type="checkbox"/> Printed material (Newsletters, Pamphlets, Newspapers, Magazines) |
| <input type="checkbox"/> Educational software/Internet | <input type="checkbox"/> Radio/Television /Video |
| <input type="checkbox"/> Field days/Focus groups/Meetings | |
| <input type="checkbox"/> Other: _____ | |

This question seeks to determine what communication avenues are presently being used by producers within northern Australia for information that assists them in farm business management. It is aimed at communication strategy development. The “Advisor/consultant” category covers a range of professionals from Agriculture Department members, private consultants through to accountants and other professionals that provide advice to producers. Examples of focus groups are bodies such as Beef Improvement Association groups, Land Care groups and Advisory committees that meet to discuss or act on specific issues. Show examples of the various forms of printed material to producers to ensure uniform interpretation of the categories.

77. What is your preferred method for the communication of information from research projects? (You may tick more than one)

- | | |
|--|---|
| <input type="checkbox"/> Advisor/consultant (face to face/phone) | <input type="checkbox"/> Printed material (Newsletters, Pamphlets, Newspapers, Magazines) |
| <input type="checkbox"/> Educational software/Internet | <input type="checkbox"/> Radio/Television /Video |
| <input type="checkbox"/> Field days/Focus groups/Meetings | |
| <input type="checkbox"/> Other: _____ | |

This question seeks to determine what communication avenues are preferred (and possibly not being used by various agencies) by producers within northern Australia. Results are to be contrasted with Q76 and Q78.

78. From which of these do you feel that you learn the most? (You may tick more than one)

- | | |
|--|---|
| <input type="checkbox"/> Advisor/consultant (face to face/phone) | <input type="checkbox"/> Printed material (Newsletters, Pamphlets, Newspapers, Magazines) |
| <input type="checkbox"/> Educational software/Internet | <input type="checkbox"/> Radio/Television /Video |
| <input type="checkbox"/> Field days/Focus groups/Meetings | |
| <input type="checkbox"/> Other: _____ | |

Learning is defined as a change in practice or perception or thinking over time as a result of encountering material through a particular pathway. We are interested in which communication vehicles have the greatest impact in facilitating learning and thus change. This is aimed at developing an effective communication strategy as outlined above.

79. Of the printed material which do you find the most useful to learn about new research findings and developments in property management?

- | | |
|--------------------------------------|---------------------------------------|
| <input type="checkbox"/> Magazines | <input type="checkbox"/> Pamphlets |
| <input type="checkbox"/> Newsletters | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Newspapers | |

Of the printed material, which do you find is the most value to you for learning? Developments in property management can be interpreted as anything that impacts on or changes the current practices being used.

80. Of the following, which do you feel assist you the most in understanding information presented in printed material about research findings and property management?

- | | |
|-----------------------------------|---------------------------------------|
| <input type="checkbox"/> Diagrams | <input type="checkbox"/> Tables |
| <input type="checkbox"/> Graphs | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Maps | |

This question assumes that print media is a widely used source of information in northern Australia. This question may provide us with information that determines the lay out of our documents. Show examples of the various categories listed above to producers to ensure uniform interpretation of the categories.

81. Of the following media which do you find the most useful as a source of information about research findings and property management?

Print media

Radio

Television

This question aims to determine what areas of the media are of use to the producer. This may highlight regional differences in use of this communication avenue.

82. Of the group activities at which do you feel you learn the most?

Field days

Meetings

Focus groups

Other: _____

This question aims to determine what group activities are more useful to the producer. This may highlight regional differences in use of this communication avenue.

Focus groups: Land Care groups, Beef Improvement Association groups.

Meetings: Formally convened gatherings for a particular purpose.

83. If information from research were to become available on the suitability of different regions to meet particular markets, which would you consider the most effective means of communicating the findings to you?

Educational software

Printed matter with graphs, maps, tables etc. (examples)

Field days/Focus groups/Meetings

Printed matter (text only)

Other: _____

This question aims to determine what avenues would be the best to disseminate the findings of a research project to the producer community. We are testing to see if regional differences exist for communicating the findings of this survey.

84. How are the records that you collect used in the management of your property?

- | | |
|---|--|
| <input type="checkbox"/> No use made of records | <input type="checkbox"/> Plan herd improvement |
| <input type="checkbox"/> Assessing herd performance | <input type="checkbox"/> Plan property improvement |
| <input type="checkbox"/> Benchmarking | <input type="checkbox"/> Seasonal trends |
| <input type="checkbox"/> Business analysis & planning | <input type="checkbox"/> Stock number adjustment |
| <input type="checkbox"/> Marketing | <input type="checkbox"/> Taxation |
| <input type="checkbox"/> Monitoring herd size | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Monitoring resources | |

How are the records that the producer collected used in the management of the farm business. A variety of uses for records exist. Records are defined as written, electronic, photographic or maps. Explanations of the various categories follow:

No use made of records: Records are collected but no use is made of them.

Assessing herd performance: Records are used to determine the performance of the herd.

Benchmarking: Records are used for benchmarking activities either internally or in dedicated benchmarking groups.

Business analysis & planning: Using records for activities such as budgeting or keeping track of production costs and returns.

Marketing: Using records of various ages or liveweight specifications of cattle to assist with their marketing.

Monitor herd size: Using herd records to keep track of herd size. This may also influence "Marketing" and "Stock number adjustment".

Monitor resources: Using various resource monitoring packages (e.g. QDPI's Grasscheck) to keep track of the state of natural resources. This section could also include regular photos/descriptions of paddocks.

Plan herd improvement: This has particular relevance to seedstock producers who might have a breeding plan in operation. Also under this category is keeping records of how many females of a particular breed are held for managing crossbreeding programs.

Plan property improvement: This category involves the use of maps, plans, etc. to plan future improvements to the property.

Seasonal trends: e.g. rainfall. Records are used to monitor the progress of the season.

Stock number adjustment: Using herd size records to assist in making decisions about herd size.

Taxation: Business records are used to assist with the preparation of tax returns etc.

85. Do you have any other comments about any other factors that impact on efficient beef production that we may not have covered in this survey. We appreciate all your comments.

This question is designed to collect information on additional issues that producers see as relevant or important due to their influence on northern Australian beef industry and its future efficiency of production. Text based responses were collected and clustered into themes (e.g. vegetation management, government policy, taxation, infrastructure, etc.).

Processing and recording data

The contents of the survey forms were entered into a Microsoft Access database. The data in the “other” categories were regularly inspected to see if additional categories could be made out of recurring themes in the responses. The final reports were produced directly from the database.

Survey results

Survey participation rate was 94% of producers approached with 3% of participants being unsolicited volunteers. More than 30% of the group were non-government agency clients or those that had irregular contact with such agencies. Producers were willing to participate since they felt the survey would provide useful information on the northern Australian beef industry that would assist with better planning and policy development in the future. Many felt that the activity was much needed and had been required since the mid-1980s.

The original survey region model consisted of 8 regions as described previously. This was done to have statistically valid group sizes. However, final reports (with limited analysis) were produced for 14 regions with a selected set of results, particularly those dealing with enterprise structure, management practice and performance, from the survey and distributed to all participants. Information from the survey was also widely distributed to both research and extension organisations and staff as well as industry bodies. The 14 regions consisted of eight in Queensland (Burnett, Central Coastal, Central Highlands, Central West, Maranoa, North West, Northern and South West), four in the Northern Territory (Barkly, Darwin-Douglas Daly, Katherine and Victoria River District) and two in Western Australia (Kimberley and Pilbara). The participants requested this level of regional reporting as it was felt it would be more relevant to them.

Discussion

Survey design considerations

The cross-referenced survey questions proved useful for double checking responses to questions. Due to the limited time and sheer size of the survey this technique made quality control of data much easier. This technique allowed consistency of answers to be monitored. Participants often perceived the relationships between questions.

A number of herd performance questions were structured where data for calculations relied on information provided in a number of questions. This helped discourage exaggerated claims being made on weaning weights etc. because calculation of annual liveweight gain depended on determining accurate ages and liveweights for weaner and sale cattle. Credible estimates of age and liveweight of sale cattle could be determined from records. If weaning weights and ages were exaggerated, then annual liveweight gains were substantially lower which often forced a revision of weaner data. Exaggerated claims were an exception.

Integrating the survey forms with a database

The survey commenced prior to the design of the database and collected a large bulk of essentially inter-related information. Initially, the database was to be used for data storage but as the project progressed, the value of the database for analysis and reporting became more evident.

Databases can be constructed to be fully relational where expected relationships between data sets are built into them prior to data input. As a result of not considering the full applications of databases, we were not able to commit the necessary resources to develop a fully relational database. This resulted in less efficient and more time-consuming methods of collating and analysing the data set.

We recommend that, with any survey work, a database specialist should be engaged prior to any data collection occurring.

Survey impact

The survey team recognised that the survey activity was a period of intensive interaction with producers. Not only would the survey produce considerable amounts of information that would be presented back to industry but it would also be an opportunity to challenge producers to think about aspects of their business and as a result facilitate change. Many producers were interested in the survey activity not only from the point of view that the information they were providing might improve research, development and extension activities but it would also provide information on how their business performed relative to others in the survey group. Producers valued the interaction and in many cases the survey team supplied participants with additional information and contacts to help raise awareness or enable them to solve problems in their businesses.

Several producers provided feedback about how challenging the survey was to complete and how it highlighted their lack of knowledge about various aspects of their business. This encouraged them to ask more questions and seek to find out more about these components of the business. The few that had business plans used this realisation to revise their plans in the relevant areas.

Post-survey follow up calls were made to about 30% of participants mainly for clarification of responses. This approach revealed approximately 15% of survey participants had made post-survey changes to their business. We attribute this to the survey challenging thinking and analysis of herd performance and other practices on the property.

Survey data was provided to a Queensland government (Departments of Primary Industries and State Development) policy project (Integrated Beef Industry Strategies). This project was concerned with determining action on issues affecting the beef industry, which at the time was close to crisis point due to extended drought and poor market conditions. A list of publications from this project are listed at the end of this document.

The survey has provided agencies with a validated data set that supports better decision making and policy development. The survey results provide a snapshot in time against which future

changes in the beef industry can be assessed. Such surveys are important for regularly taking stock of how the industry has changed and what issues are becoming important.

Record keeping

Overall, the standard of record keeping by participants was good since the records, albeit unsorted at times, were able to support the survey data requirements. Only six producers were unable to support the survey with their business records. Producers unwilling to provide records to fully support the survey were excluded from the survey.

Full use is not made of record keeping in the beef industry. Producers are told to keep records for their business but they have not been shown how to make use of them. Thus the records were mainly structured around servicing the information requirements for the financial and taxation systems. As a result, conceptual links between biological and financial aspects of the business were not strong. Given the increasing financial stress farm businesses experience, this represents an opportunity for extension services that have started working in the area of farm business planning. This is an area for assisting graziers improve their use of records through a more holistic approach to their business.

Reproduction

Record keeping aside, problems were encountered with obtaining accurate estimates of branding rates. Seven (7) different methods were used by producers to calculate branding rates in their herds:

1. Total calves branded / total joined females (all cows and heifers exposed to bull).
2. Total calves branded / total cows mated (no heifers included but their calves are counted in the calculations).
3. Total calves branded / total joined females less culls found empty on pregnancy test.
4. Total calves branded / total cows mated + pregnancy tested in-calf heifers.
5. Total calves branded / total cows and heifers mated less the cull cows and undesirable types.
6. Variation on 5 but don't count the heifers.
7. Reproductive index: Calves / Total females (including weaner and other unjoined females to enter the herd) + Bulls.

We used Method 1. This caused many strong objections due to the lower branding rates obtained when compared with other methods. It was pointed out to participants that this was a standard and accepted method of calculating branding rate. Where heifer joining (particularly yearling) was practised, there can be a substantially lower branding percentage. Another situation where problems with this technique were encountered was single muster breeding herds where the heifers were introduced into the herd in time for their calving to commence not long after mustering for branding and weaning the following year. For example, the heifers were introduced into the breeding herd around November; mustered in the May branding and weaning round but will calve in October. This latter situation occurred on two properties.

We considered that many of these methods may have come about as a result of the producer community being told what branding rate they should be getting. The producers subsequently use an "adaptive" calculation technique where classes are either added or removed until a

similar value is obtained. Whether or not this has its foundations in self esteem, that is, it is difficult to admit to a poor performing business, was not tested.

Annual Liveweight Gain

Given that the ages of the animals used to determine annual liveweight gains were generally not accurately determined, the annual liveweight gains calculated for the various pasture communities should be interpreted with caution. Season and individual property stocking rates would also have influenced liveweight performance.

The use of a standard 55% dressing percentage when using the meatworks feedback sheets to estimate on property liveweight is open to criticism since there was potential to disadvantage cattle outside of southern and central Queensland. We concede that there may be a possible disadvantage for northern cattle but it was not evident in the experience of the survey team. In many cases we were able to cross check our calculations for liveweight with cattle that were weighed prior to trucking. The 55% dressing percentage proved to be reasonably accurate when we had the opportunity to use property weights for checking this. The use of a standard 55% dressing percentage avoided confusion that would have been caused by the use of a range dressing percentages for regions or districts.

Markets

A number of problems were encountered in the questions concerning markets. Noteworthy was that in the Burnett and Maranoa regions we encountered confusion between store and domestic market destinations for cattle. Examination of the sales records indicated that these were often cull cows (>8 years of age) sold at store cattle sales or directly to other producers to finish. In some, albeit an extremely limited number of cases, this class of cattle were purchased by local butchers for slaughter to supply a local market. In southern areas, many weaner-aged cattle can either be slaughtered as “yearlings” or go on to crop, pasture or feedlot for growing and finishing. This could be an important factor in any confusion which exists.

There seemed to be either a reluctance to admit to selling store cattle or there was confusion about the definition of store and domestic markets. This may have come about by producers differentiating between live cattle for export and live cattle for use in the national market.

Due to misinterpretation of feedback sheets from the meatworks, several producers were convinced they were supplying cattle to certain markets (e.g. Domestic or European) despite the cattle being of an age and class that precluded them from the market. This impacted on their husbandry practices.

Assessing the condition of the natural resource base

The concept of pasture condition caused many problems. Many producers have a different concept of what pasture condition is compared with that of the scientific community. The concept of pasture condition we used was botanical and soil erosion based where a pasture community that was suffering from erosion and invasion by weed species would be assigned a poorer condition rating than one that was relatively undisturbed.

The producers' concept of pasture condition was based more on yield than botanical composition or state. The species make-up or state of the soil was seen as a secondary consideration. This would suggest that, when pasture condition is discussed, the message may be confused due to differing perceptions or understanding about the concept of condition.

Outcomes

As a result of this survey work we have built a detailed understanding of the structure and function of the northern Australian beef industry. This includes the rate limiting steps to improving future productivity and natural resource sustainability.

A series of papers that report the findings of the survey are planned for publication:

1. Regional enterprise activity and structure.
2. Breeder herd management and reproductive performance in northern Australia.
3. Liveweight performance of cattle grazing northern Australian pasture communities.
4. Pasture and rangeland management strategies of northern Australian beef properties.
5. Pasture species introductions and rangeland management strategies of northern Australian beef properties.

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