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Kimberley and Pilbara RD&E program: Phase 1

Pastoral Industry Survey of the Kimberley and Pilbara regions, Western Australia – 2010

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Abstract

The 2010 Kimberley and Pilbara Pastoral Industry Survey was conducted to provide a snapshot of the productivity, profitability and current management practices and issues within the pastoral industry. It also provides industry, industry bodies and government agencies with information to direct future research, extension and industry development activities to benefit the growth of the industry in the short and long terms. The survey was conducted on a face-to-face basis by Department of Agriculture and Food, Western Australia (DAFWA) staff with 77 (64%) of the potential 120 pastoral businesses being interviewed.

Executive Summary

The pastoral industry survey of the Kimberley and Pilbara regions of Western Australia was conducted to gain a better understanding of industry management practices and performance. The survey data in conjunction with more detailed data from an associated business benchmarking project in these regions will assist the development of the Department of Agriculture and Food, Western Australia's and Meat and Livestock Australia's research, development and extension activities in the Kimberley and Pilbara regions. The survey also provides a useful baseline to determine the effectiveness of future programs.

The survey was conducted between July and December 2010 via face to face interviews with producers in the Kimberley and Pilbara regions. The survey team interviewed 77 businesses from the two regions which represents more that 60% of the commercial cattle enterprises. The survey covered topics of business ownership and management, production and herd management, grazing and land management, and extension and training.

The survey recorded a wide range of results, with responses varying both within and between districts, and between the various classes of businesses (privately-owned, corporate, indigenous etc).

The survey will benefit the Kimberley and Pilbara pastoral industry by enabling research and development agencies to better match programs to industry needs. Through the integration of the survey information with more detailed business level information from the benchmarking project it will be possible to identify the major issues that influence the profitability and sustainability of the industry.

Acknowledgements

The survey team wish to sincerely thank the many pastoralists who willingly provided time, information and support to answer the many questions in the survey.

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1. Background

Between 2008 and 2010 a number of studies on the West Australian beef industry revealed that the Kimberley and Pilbara industries were performing below their potential (McCosker *et a*l 2010, Niethe and Quirk 2008, Holmes *et al* 2010). A combination of issues such as poor breeder performance, high death rates and limited market opportunities were responsible for this sub-optimal production and financial performance. In response, Meat and Livestock Australia (MLA) and the Department of Agriculture and Food, Western Australia (DAFWA) developed a research, development and extension (RD&E) program to assist the industry to achieve improved performance. One of the priorities was determined to be the need for accurate data on management practices, production and financial performance. This information was to be obtained in two ways:

- Establishing and working with two producer groups, one in the Kimberley and one in the Pilbara, who would undertake production and financial benchmarking with the aim of identifying the current issues and limitations common to businesses in the group, and

- Carrying out an industry wide survey to gain a better understanding of current management practices and industry performance. This survey would also provide a baseline for assessing the success of future activities.

This report covers the second project, the Kimberley and Pilbara Pastoral Industry Survey which was carried out in 2010.

2. Project Objectives

The objectives of the Kimberley and Pilbara RD&E program: Phase 1 project were:

1. Benchmark current and historical property level production and financial performance of:
    i. at least eight Kimberley properties; and
    ii. at least an additional five Pilbara properties on top of the three existing properties that have previously been analysed (total eight properties).

2. Complete a census of industry management practices and performance for the Kimberley and Pilbara regions.

3. Identify for each of the Kimberley and Pilbara producer groups/regions priority business development and management issues for investigation in Phase 2 of the Program.

4. Develop and implement a Communication Plan for the Kimberley and Pilbara RD&E Program that creates linkages between all activities including PDS sites and Beef Up forums.

5. Develop and implement an Evaluation Plan that enables monitoring and measurement of the impact of Program activities.

3. Survey Region Descriptions

The Kimberley and Pilbara regions of northern Western Australia cover an area of 422,000 km^2 and 645,000 km^2 respectively, with tourism, mining, horticulture (Kimberley) and pastoralism being the main industries. Climatic conditions and land systems vary significantly across each region, and for the purpose of this survey the Kimberley and Pilbara were divided into their main geographic/climatic regions (Figure 1).

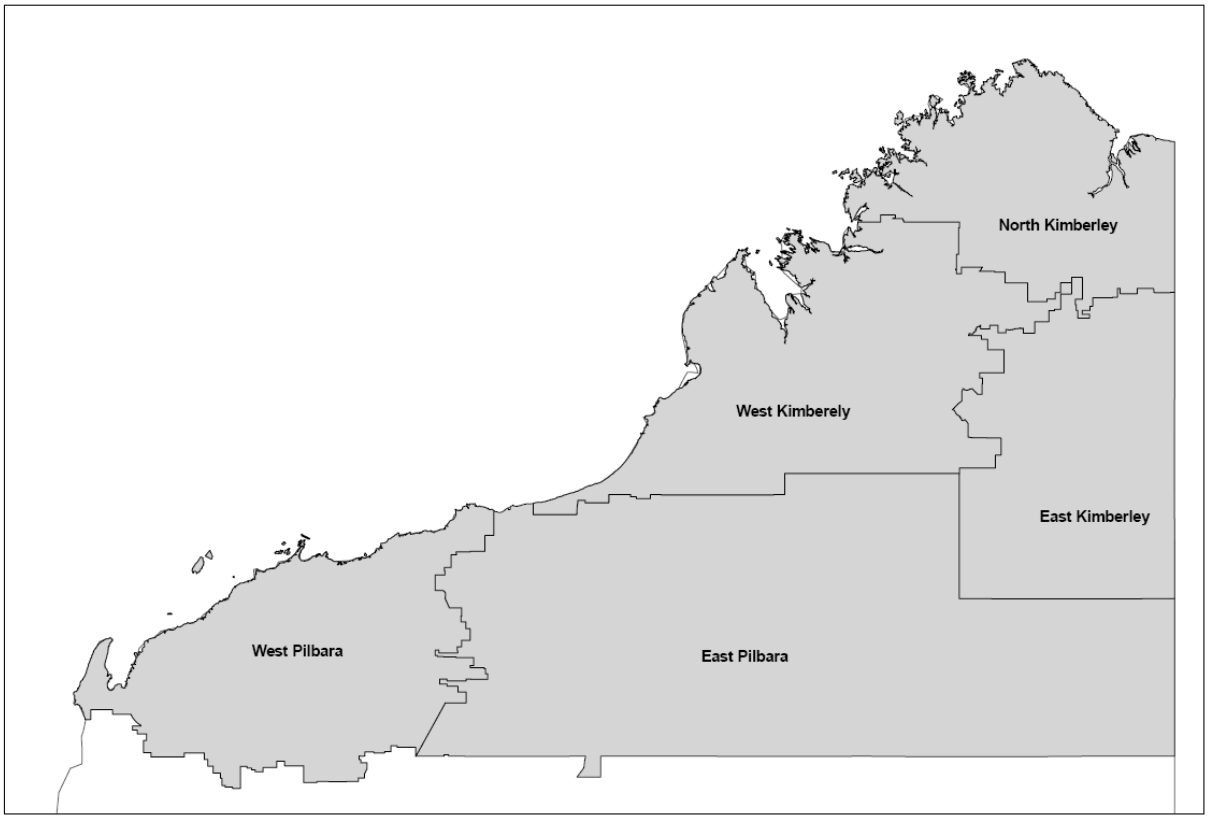

Figure 1: District boundaries used for the 2010 Pastoral Industry Survey

The Kimberley region extends from Carson River Station in the north to Wallal Downs Station in the south west and Lake Gregory Station in the south east. The region is characterised by distinct wet and dry seasons, with the wet season generally occurring between November to April in the north and December to March in the south. Annual rainfall declines north to south and west to east, with Kalumburu in the North Kimberley receiving 1,221mm average rainfall and Broome in the south-west 526mm

The 94 Pastoral leases in the Kimberley have a combined total area of approximately 224,000 km^2 supporting 67 pastoral enterprises. Fifty-six of these enterprises comprising, 34 private, 5 corporate and 17 indigenous owned are considered to be operated as commercially viable cattle businesses (Table 1).

Table 1. Ownership structure of businesses and pastoral leases in the Kimberley and Pilbara

	Kimberley		Pilbara	
Ownership structure	**Businesses**	**Leases**	**Businesses**	**Leases**
Private	34	46	34	43
Corporate	5	12	0	0
Mining Company owned	0	0	9	10
Indigenous	25	17	4	5
Non-commercial	11	11	4	6
Total	**67**	**94**	**51**	**64**

The pastoral area of the Pilbara covers approximately 154,000 km^2 and extends from Pardoo Station in the north to Yanrey Station in the south-west and the town of Newman in the south-east. Rainfall varies little across the region, with averages between 310 and 320mm. Rainfall occurs mainly between November and April. often in association with cyclonic influences, with some falls occurring up to June. High temperatures and associated high evaporation rates limit rainfall efficiency and pasture growth.

There are a total of 64 pastoral leases in the Pilbara. Of these, 59 are considered commercial cattle enterprises and comprise 51 businesses. There are 4 are indigenous owned commercial businesses, 9 owned by mining companies and operated as commercial cattle businesses and 34 privately owned and operated commercial cattle enterprises. Four businesses comprising six leases are considered non-commercial (Table 1).

4. Method

The survey questionnaire was based on the format of the 2004 Northern Territory Pastoral Industry Survey. Input was sought from MLA and the Northern Territory Department of Resources survey team to review and revise the questionnaire based on the experience of the 2004 survey and past MLA telephone surveys.

The survey was conducted on property through face-to-face interviews by DAFWA staff. The survey team was coordinated by Peter Smith, and included Anne Marie Huey and Matthew Fletcher in the Kimberley and Rebecca Dray in the Pilbara. Collation and summarising of data was completed by Rebecca Dray.

Questions were asked on a business, rather than individual lease basis within each survey region. When an individual owned more than one property, it was determined whether each property was run as a stand alone business or whether they were managed as part of a larger multi-property enterprise. Where leases were owned by the same business in different survey regions, individual responses for each region were collected.

Pastoralists were surveyed on property/business performance in five different districts: East Kimberley, North Kimberley, West Kimberley, East Pilbara and West Pilbara. The number of respondents (businesses) participating in the survey within each district are shown in Table 2. Forty-nine businesses in the Kimberley were surveyed which accounts for 73% of all businesses and 88% of commercial cattle enterprises in the region. While every effort was made to survey all businesses in all districts, some non-commercial properties were omitted due to a complete lack of management. Where possible, though, non-commercial businesses were included in the survey. A further small number of pastoralists declined to participate in the survey (Figure 2).

Table 2: Number of respondents from each survey district

Survey District	Number of Respondents	Total Businesses in District	% Surveyed
East Kimberley	18	24	75%
North Kimberley	5	11	45%
West Kimberley	26	33	79%
East Pilbara	11	22	50%
West Pilbara	17	29	59%
Total	**77**	**119**	**65%**

Figure 3 shows the pastoral leases within each of the survey areas of the Pilbara. A total of 28 businesses or 64% of the commercial businesses in the Pilbara participated in the survey, 11 in the East Pilbara and 17 in the West Pilbara.

Pastoralists were surveyed on a range of topics relating to ownership, business management, property description, herd, grazing and natural resource management and business issues. A large part of the survey was designed to determine current management and performance of breeders. The survey also recorded a detailed breakdown of turnoff and marketing options used by the industry in 2009 and 2010. Appendix 1 contains a copy of the survey questionnaire.

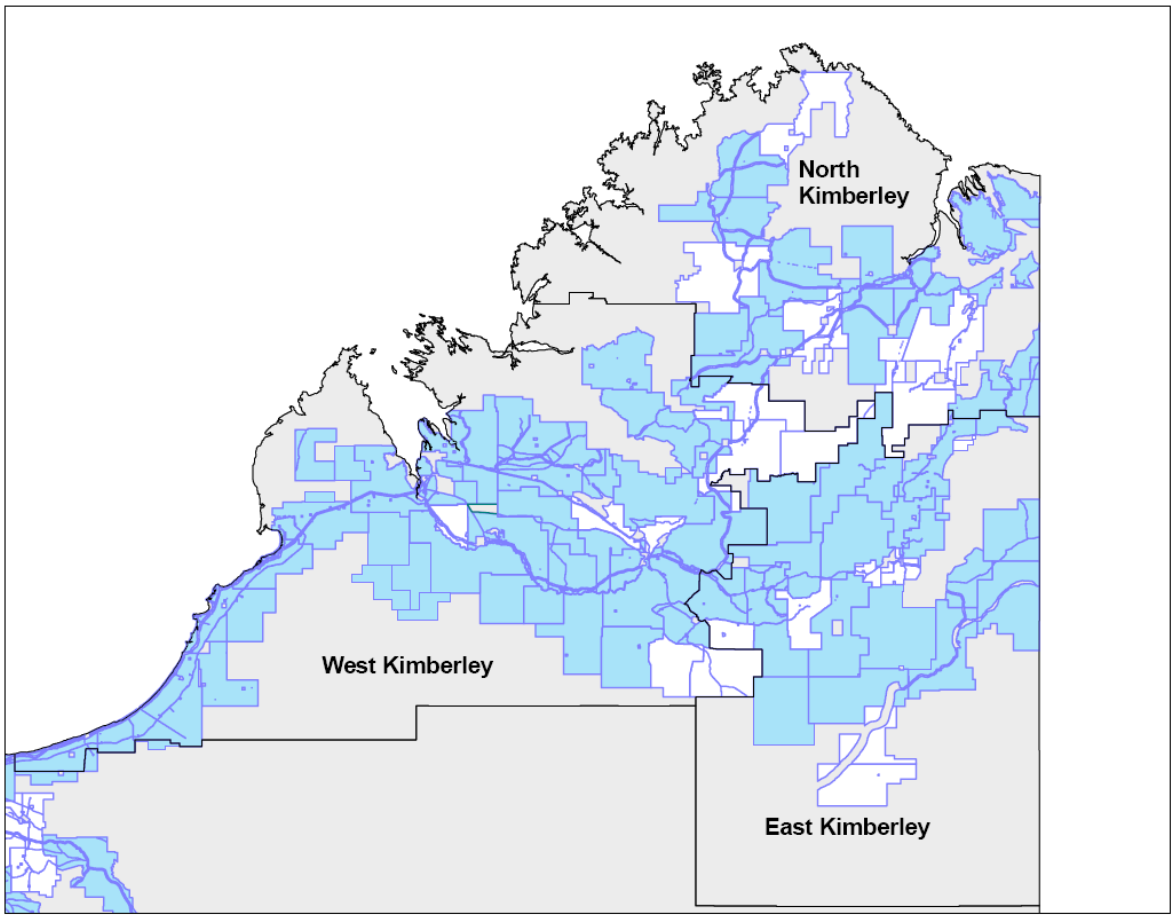

Figure 2: Map showing pastoral leases in the Kimberley and those participating in the 2010 Pastoral Industry Survey (shown in blue)

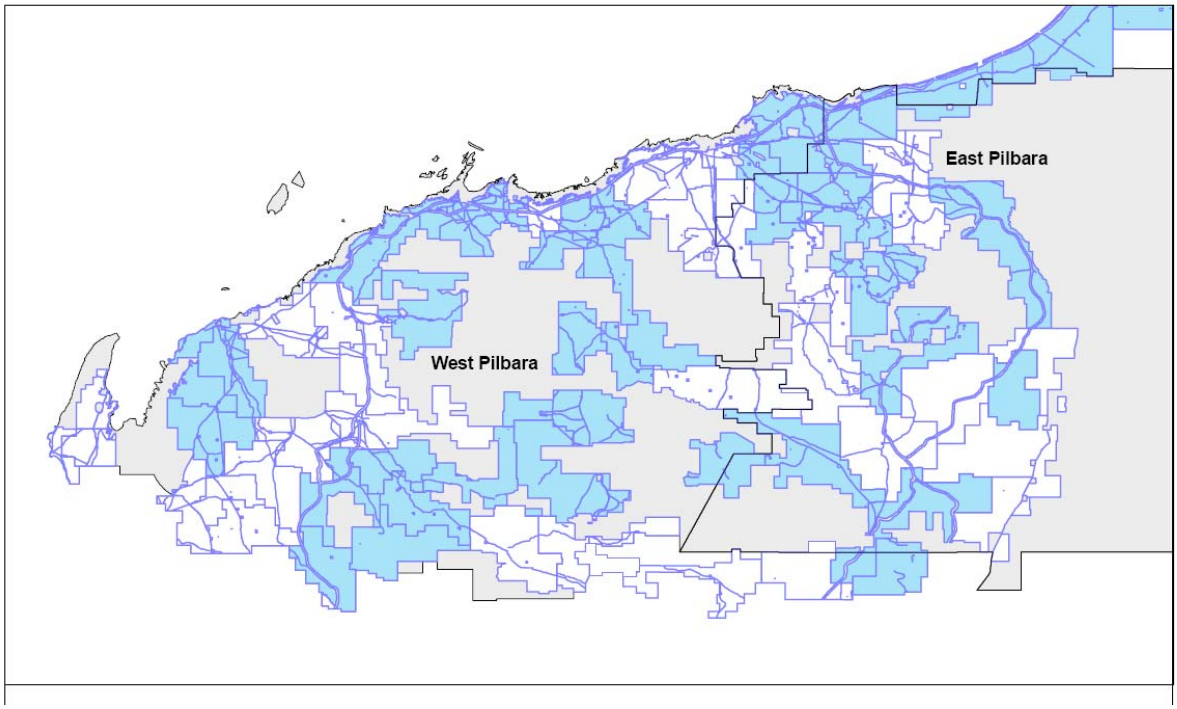

Figure 3: Map showing pastoral leases in the Pilbara and those participating in the 2010 Pastoral Industry Survey (shown in blue)

5. Results and Discussion

5.1 Pastoral Industry Description

Property Ownership and Management

Ownership structure of businesses varied across the regions (Table 3). Owner-managers were the largest proportion of all respondents in all areas except the West Pilbara. The West Pilbara (41%) and East Kimberley (39%) had the highest level of company ownership while Indigenous corporations (27%) also the highest representation in the East Kimberley.

Table 3: Business ownership and management structure and length of ownership and management of surveyed businesses (not total businesses)

Ownership	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Indigenous Owned	5	1	6	2	1
Private Owned/ Employed Manager	3	2	5	1	4
Owner Managed	3	2	10	5	4
Company/ Manager	7	0	5	2	7
Private owned /sub-leased	0	0	0	1	1
Av years owned (Range)	16 (2-32)	21 (4-65)	21 (3-128)	15 (2-40)	20 (1-88)
Median years owned	20	10	18	13	18
Av years managed (Range)	11 (2-26)	11 (1-32)	14 (2-42)	9 (2-21)	9 (1-36)

Median years managed	11	10	12	5	5

Whilst the average length of ownership of businesses in all districts is between 15 and 21 years, the survey highlights the large variation in time individual properties have been owned by the same business (1-128 years). The average length of time individual managers have been on the one property is similar across all districts, although again there is a wide variation in individual manager tenure (1-42 years). All districts also had businesses owned and managed for less than 4 and 2 years respectively, illustrating more than 6% of managers have less than 2 years management experience on that property.

Business size, grazing areas and other uses

The average area of land managed by individual businesses varied considerably both between and within districts (Table 4), although variation was greater within districts. Fifty-seven percent of businesses deliberately exclude regular grazing on part of the lease. Reasons cited for excluding regular grazing include country being unsuitable for grazing and areas being deemed uneconomic to develop.

Ten percent of Kimberley properties have tourism operations while 61% of Pilbara properties have mining activities occurring on their lease. 'Other' enterprises/operations include Aboriginal communities, helicopter mustering businesses, Indigenous training centres, mining accommodation, contracting and steel fabrication works. Only one of the business surveyed in each of the Kimberley and Pilbara produced hay.

Table 4: Business size and areas used for grazing ('000 ha) in each district

District	Average Size ('000ha)	Range ('000ha)	Average Grazing ('000ha)	Range ('000ha)
East Kimberley	398	45 – 934	357	3 - 934
North Kimberley	372	197– 616	193	100– 400
West Kimberley	312	50– 1,300	274	19 – 1,170
East Pilbara	341	198– 761	280	120 – 724
West Pilbara	241	56– 404	190	30 – 375

Infrastructure development

The East Kimberley district has the highest average number of paddocks per business and greatest range of paddock sizes. In contrast, the large area of property not accounted for in the North Kimberley paddocks suggest that large areas of these properties are unfenced and have minimal infrastructure development (Table 5).

Table 5: Average number and size ('000ha) of paddocks and the range of the average smallest and largest paddock sizes in each survey district

District	Average Number of Paddocks	Average Size Paddocks ('000ha)	Range – Average ('000ha)
East Kimberley	21	35	4 - 67
North Kimberley	4	15	11 – 20
West Kimberley	15	21	10 - 62
East Pilbara	8	14	6 - 48

West Pilbara	14	8	2 – 21

The North and East Kimberley have higher numbers of natural water points in contrast to the much drier West Kimberley and Pilbara. These latter districts and the more developed East Kimberley rely predominantly on man-made water sources. With higher rainfall and lower level of infrastructure development, the North Kimberley has by far the smallest number of man-made water points (Table 6).

Table 6: Average number of natural and man-made water points per business in each of the survey districts

District	Average[1] Natural	Range Natural	Average Man made	Range Man made
East Kimberley	59	0 – numerous[2]	41	0 - 137
North Kimberley	81	3 - numerous	7	2 -16
West Kimberley	51	0 - numerous	42	2 - 260
East Pilbara	56	2 - 250	49	12 - 114
West Pilbara	11	0 - 70	46	10 - 150

[1] A natural water point is defined as any permanent free-flowing or naturally occurring water source.

[2] Numerous - refers to running streams

Additional water point development was rated as the highest priority for further infrastructure development by 40 respondents. This represents approximately 52% of businesses surveyed. Fencing and paddock development were the highest priorities for 19 businesses, or approximately 25% of respondents (Table 7).

Table 7: The highest priorities for infrastructure development as identified by businesses in the survey districts (n)

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara	Total (n)
Paddocks	1	0	1	1	3	6
Fencing	2	0	2	5	4	13
Water points	8	3	14	6	9	40
Drafting yards	5	0	1	2	1	9
Trap yards	0	0	3	0	1	4
Laneways	0	0	1	0	0	1
Accommodation	0	0	1	0	1	2
Roads	1	2	1	0	0	4
Sheds	0	0	0	0	0	0
Telemetry	0	0	2	0	0	2

Staff and Labour

Labour requirements across all districts vary throughout the year, with seasonal staff needed during mustering to complement permanent staff. In all districts, businesses employed higher numbers of seasonal staff than permanent staff (Figure 4). The North Kimberley had the highest total staff (15), which probably relates to the higher staff requirements for the tourism activities, rather than the pastoral enterprises.

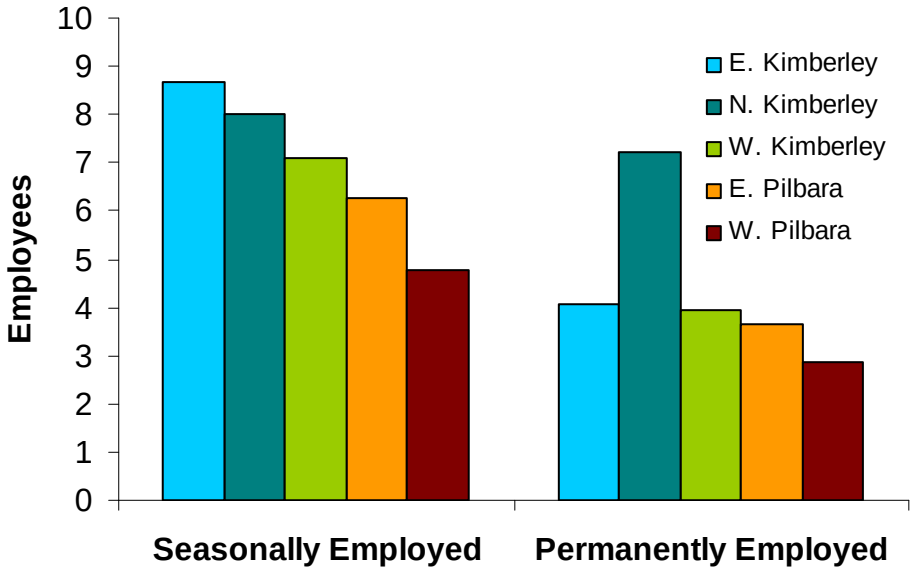

Figure 4: Average numbers of seasonal and permanent staff employed by each business within each of the survey district

Retention of staff is considered to be a significant issue for many businesses, with 42% of respondents indicating operations are limited by staff availability and/or turnover. Recruitment of staff was conducted mainly through word-of-mouth (48%), recruitment agencies (22%) and newspaper advertisements (10%).

Staff training occurs on 99% of properties. The majority of this is informal, on-the-job based training (93%) but approximately half the businesses have staff engaged in accredited training programs such as TAFE courses (51%). Forty-two percent of businesses undertake non-accredited training with topics such as livestock handling and horsemanship being most common (Table 8).

Table 8: Percentage of respondents who provide training to staff in selected topics

Training Topic	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Livestock Handling	94	40	88	100	100
Horsemanship	67	40	46	18	65
Pregnancy Testing	39	0	12	18	35
Bull Selection	39	0	12	18	35
Breeding EDGE	6	0	4	0	0
Nutrition EDGE	0	0	23	9	0
Business Management	6	0	42	9	12
Grazing Land Management	50	20	35	27	41
Rangeland Management	44	20	27	18	47
Monitoring and Carrying Capacity Assessments	56	0	19	18	24
Other	11	80	27	18	29

Labour saving measures

Laneways were the most common labour saving measure implemented by respondents, with around 50% of the Kimberley and Pilbara businesses surveyed using laneways to reduce labour costs of mustering and handling cattle. Other labour saving measures include the use of helicopters, trap yards, machinery, pipelines, pneumatic drafting and portable race drafts.

Management plans

Respondents were asked whether their business had a documented management plan. Forty-four percent of respondents had a management plan, with the majority of these plans including aspects of financial management (Table 9).

Table 9: Businesses with documented management plans (%)

	Financial Management	Sustainable Production Systems	Human Resource Management	Natural Resource Management
East Kimberley	92%	58%	50%	75%
North Kimberley	100%	0%	0%	0%
West Kimberley	75%	58%	58%	75%
East Pilbara	50%	100%	50%	50%
West Pilbara	71%	71%	29%	71%

Forty-seven percent of respondents reported that they use financial or production benchmarks to help with their management decisions. Seventy-seven per cent of respondents use tools such as photo monitoring sites and rainfall records to assist in management of the natural resource on their property. Of those who do not currently use benchmarks, 52% believed it would be a useful tool.

5.2 Reproduction & Herd Management

Business and breeding objectives

In 2009 and 2010, the majority of pastoral businesses in northern Western Australia were breeding and selling cattle for the live export feeder and slaughter market, with approximately 80% of Kimberley producers and 69% of Pilbara producers surveyed targeting this market. The enforcement of the 350kg weight limit for the Indonesian market during 2010 curtailed the export of slaughter cattle to that market. The second most common enterprise in the Pilbara is breeding and selling slaughter cattle (17%). Only one business surveyed in the Kimberley targets the slaughter market. Of the businesses surveyed, the Kimberley and Pilbara each have three businesses that primarily breed and sell/transfer cattle to other regions in Australia (Table 10).

Table 10: Number of surveyed businesses by cattle enterprise and market

Enterprise description	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Breed and sell live export feeder cattle	13	4	23	9	11
Breed and sell or transfer for growing elsewhere	2	0	1	0	3
Breed and sell slaughter cattle	1	0	0	2	3
Growing or finishing transferred cattle	1	0	1	0	0

Herd Structure

Average herd size per business ranged from 5,070 (West Pilbara) to 15,758 (East Kimberley). In all districts, average breeder numbers represented approximately half the herd (Table 11).

Table 11: Average herd size and breeder numbers by survey district

District	Average herd size	Average number of breeders	% breeders
East Kimberley	15,758	7,960	50.5%
North Kimberley	5,200	2,675	51.4%
West Kimberley	13,199	6,571	49.8%
East Pilbara	8,833	4,780	54.1%
West Pilbara	5,070	2,350	46.4%

Brahman and Brahman cross cattle are the predominant breed being run in the east and West Kimberley. Three of the five North Kimberley businesses surveyed run Shorthorns, with the others running Brahman cross cattle. Approximately one third of businesses in the East Pilbara run Shorthorn cross cattle, with remaining businesses being fairy evenly split between Brahman crossbred, Droughtmaster and Santa Gertrudis herds. Brahman crossbred cattle are most common in the West Pilbara, with Droughtmaster cattle also making up a significant proportion of the herd (Table 12).

Table 12: Predominant breed for each survey district (%)

Breed	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
n	18	5	26	11	17
Brahman	39%	0%	31%	0%	6%
Brahman Cross	33%	40%	46%	18%	41%
Shorthorn	11%	60%	0%	0%	6%
Shorthorn Cross	17%	0%	8%	36%	6%
Droughtmaster	0%	0%	12%	18%	24%
Santa Gertrudis	0%	0%	0%	18%	6%
Multi-breed	0%	0%	4%	9%	12%

The main breeding objectives of businesses surveyed in the Kimberley were to upgrade to Brahman and, where the herd already had a high Brahman content, to select traits within the breed to improve the overall performance of the herd. In the Pilbara the main breeding goals were to upgrade to a tropical breed other than Brahman and to continue to select desirable traits within the current herd (Table 13).

Table 13: Main breeding objective of Kimberley and Pilbara businesses surveyed

Breeding objectives	Kimberley	Pilbara
n	49	28
To upgrade to Brahman	33%	11%
Upgrade to other tropical breed	0%	28%
To develop composite breed	0%	4%
To cross breed for improved herd performance	12%	18%
To select traits within breed	31%	21%
To cross breed to suit market	10%	14%
Concentrating on management, not genetics	4%	0%
Other	6%	4%

Weaner Management

Mortality rates in the Kimberley were considered to be reasonably consistent for 2008 and 2009 across all classes of cattle. However, Pilbara producers believe mortality rates, particularly of weaners and old cows, increased in 2009.

The weaning rates recorded for all classes of females were generally consistent in both 2008 and 2009 in the Kimberley, with rates marginally less for maiden heifers and old cows in the Pilbara in 2009 (Table 14).

Table 14: Estimated mortality and weaning rates for classes of females in 2008 and 2009

				Mortality%		
		Weaners	Maiden	1st Calf	Breeders	Old Cows
Kimberley	2008	3.5%	4.9%	5.0%	4.8%	7.4%
	2009	3.6%	4.8%	4.9%	5.0%	7.3%
Pilbara	2008	3.3%	3.1%	4.1%	4.1%	6.9%
	2009	5.9%	3.8%	4.5%	4.5%	8.3%
				Weaning%		
		Weaners	Maiden	1st Calf	Breeders	Old Cows
Kimberley	2008	-	65%	59%	67%	67%
	2009	-	64%	58%	67%	68%
Pilbara	2008	-	72%	54%	71%	71%
	2009	-	68%	54%	70%	66%

Approximately 93% of managers implement some form of weaning strategy. The most common strategy is to wean down to a different weight each year depending on seasonal

conditions (68%) (Table 15). Minimum weaning weights for a normal year range from an average of 90 kg in the North Kimberley to 149 kg in the West Kimberley. In a bad year, the range drops to a minimum average of 79 kg in the East Pilbara to a maximum average of 107 kg in the East Kimberley (Table 16).

Table 15: Weaning strategies employed by managers surveyed (n)

District	Minimum Age	Weight determined by seasonal conditions	Set Weight
East Kimberley	5	10	3
North Kimberley	2	1	0
West Kimberley	0	16	6
East Pilbara	0	11	0
West Pilbara	3	14	1

Table 16: Weaning weights by seasonal conditions (kg)

District	Normal Year Average	Bad Year Average	Normal Year Minimum	Bad year Minimum
East Kimberley	134	107	80	50
North Kimberley	90	80	80	80
West Kimberley	121	97	80	50
East Pilbara	130	79	60	50
West Pilbara	149	89	120	30

Managers employ a number of feeding strategies for weaners. Feeding in yards with hay is the most common practice, with many producers implementing additional strategies such as grazing weaners in spelled paddocks, feeding a concentrate in the yards and providing supplementary feed for the dry season (Table 17).

Table 17: Weaner feeding strategies (n)

District	Yard Feeding with Concentrate	Spelled Pasture	Yard Feeding with Hay	Supplement Dry Season	None	Other
East Kimberley	3	8	15	3	0	4
North Kimberley	1	1	1	1	1	0
West Kimberley	8	10	17	3	0	2
East Pilbara	3	5	8	0	0	2
West Pilbara	5	9	13	1	1	3

Heifer Management

The number of heifers kept as breeder replacements was relatively stable for 2008 and 2009 in all of the survey districts except for the North Kimberley which reduced the number retained in 2010 (Figure 5).

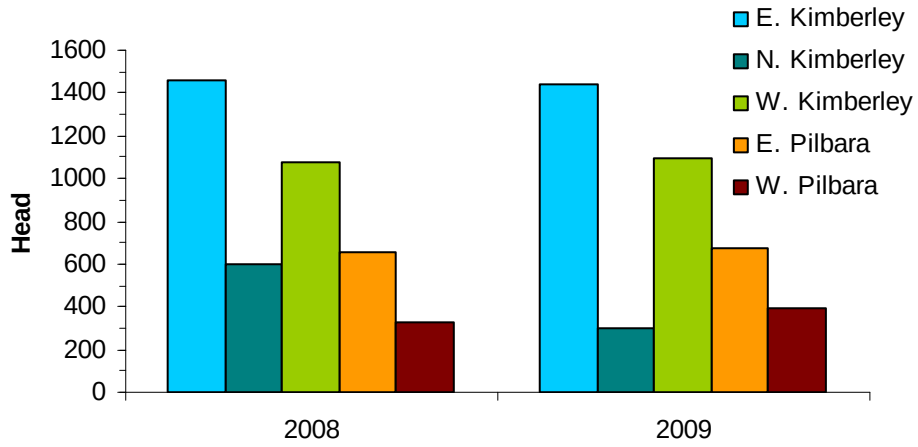

Figure 5: Average number per surveyed business of replacement heifers retained as breeders

Heifer selection is primarily done at weaning and prior to joining. Approximately 27% of producers surveyed in the West Kimberley, 22% in the East Kimberley and 17% in the West Pilbara conduct further selection based on pregnancy diagnosis after first joining. Only one business in each the North Kimberley and East Pilbara implement this strategy. Three businesses in the West Kimberley and one business in the West Pilbara extend the selection process until the weaning of the first calf. Conformation, phenotype, temperament and fertility were considered the four most important factors influencing selection of replacement heifers.

The strategy of managing heifers separate to the breeder herd following first mating is not widespread, with only 8% and 9% of managers segregating these young females until the start of second joining and weaning of the first calf respectively. Other segregation strategies recorded include running breeders in lifetime cohorts and segregating heifers until the weaning of their second calf (Table 18). The main reason for not segregating heifers is the lack of available paddocks.

Table 18: Heifer segregation practices (n)

District	Start 1st Joining	Start 2nd Joining	After Weaning 1st Calf	Other
East Kimberley	9	2	1	1
North Kimberley	1	0	0	1
West Kimberley	13	1	2	3
East Pilbara	6	0	2	0
West Pilbara	10	3	2	1

Heifers are most commonly first mated between the ages of 18 and 24 months, except in the North Kimberley where mating occurs whenever the heifer reaches sexual maturity and in the East Pilbara where the age spread is fairly even between the ages of 12 and 24 months (Figure 6). Seventeen percent of producers weigh heifers before mating. The majority of heifers in the Kimberley and Pilbara typically weigh between 250 kg and 300 kg when mated for the first time (Figure 7).

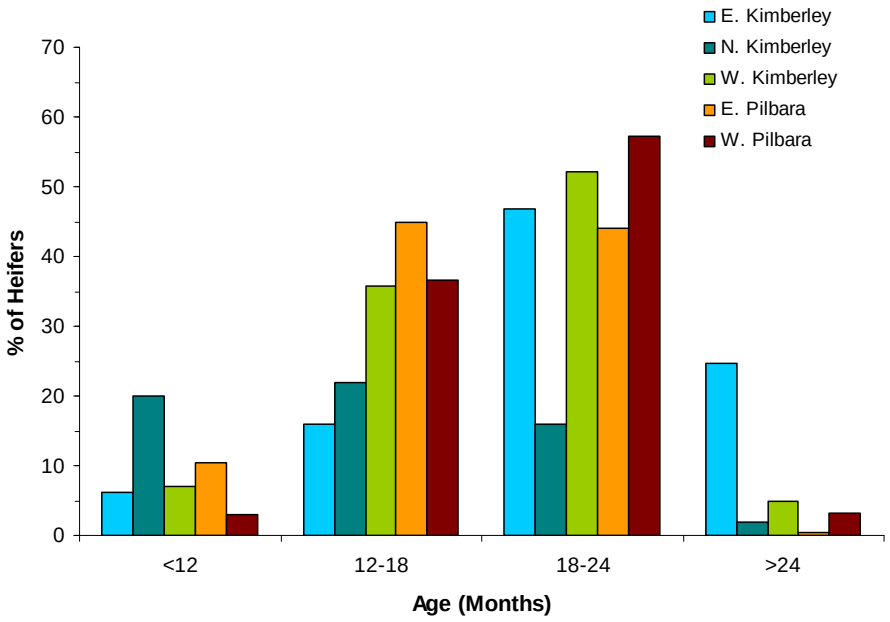

Figure 6: Average age range of heifers when first joined

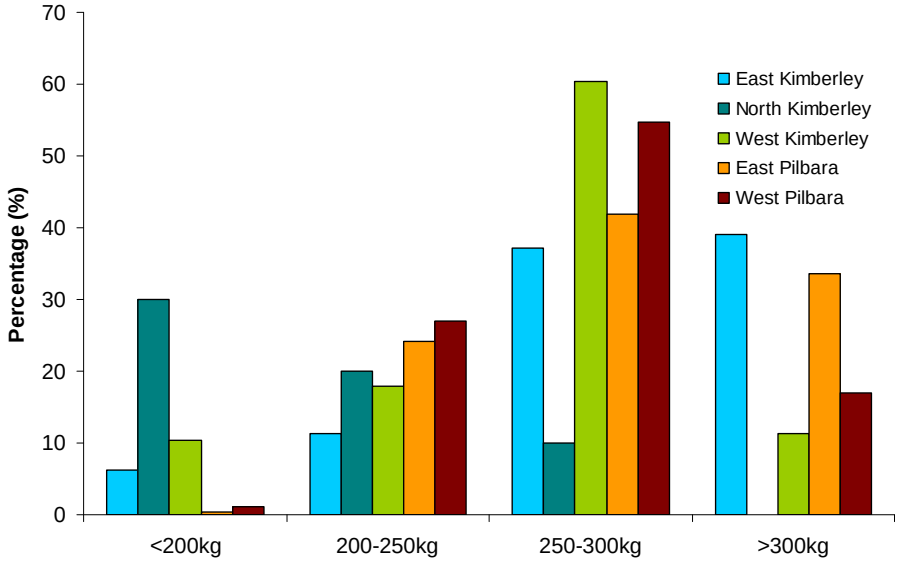

Figure 7: Estimated weight range of heifers when first joined

More respondents in the West Pilbara mate heifers with young bulls (less than 3 years old) than in other districts (Table 19). No surveyed businesses artificially inseminate heifers.

Table 19: Number of businesses mating heifers to young bulls (<3 years of age) and those mating heifers with herd bulls of all ages.

District	Young bulls (<3 yrs)	Herd Bulls (all ages)
East Kimberley	7	8
North Kimberley	0	5
West Kimberley	11	13
East Pilbara	3	8
West Pilbara	11	6

The most important factor determining when calves are weaned from first lactation females is station mustering practices (57%) although 36% of managers also consider the condition of these females when determining weaning strategies (Table 20).

Table 20: The number of businesses and factors that determine when calves are weaned from heifers

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Condition of Heifers	8	0	11	3	6
Access to Heifers	2	0	4	1	1
Time of Year	5	0	7	0	1
Mustering Practises	7	3	18	10	6
Effect of Lactation on Heifers	2	0	0	1	1
Pasture Condition	2	0	3	1	6
Labour Availability	2	0	0	0	1
Other	1	1	1	0	0

The four most widely implemented strategies to improve heifer performance were vaccination against disease, managing bull percentage, use of better paddocks and managing them as a separate group (Table 21).

Table 21: Number of surveyed businesses currently implementing management strategies to improve heifer performance

Management strategy	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara	% implementing
Manage Separate	11	0	8	7	6	42%
Bull Control	4	0	7	5	4	26%
Supplements	7	1	13	4	3	36%
Better Paddocks	11	1	11	5	5	43%
Vaccination	12	2	19	9	6	62%
Time of Weaning	9	1	6	4	2	29%
Early Weaning	8	1	7	3	1	26.%
First joined as a yearling	1	2	11	1	3	23%
Pregnancy testing	6	1	9	3	4	30%
Bull Testing	5	1	11	3	4	31%
Bull Percentage	12	1	12	6	3	44%
Age of Bulls	7	1	9	3	4	31%
Genetics for Fertility	5	1	8	1	5	26%

Breeder management

Thirty-seven percent of producers segregate breeders into different groups for management purposes. In the East Kimberley, the most common criteria for segregation are pregnancy status and body condition score. In the West Kimberley and West Pilbara the most common criteria for segregating breeders is age.

Yearly pregnancy testing of at least some breeders (generally dry cows) is most common in the East and West Kimberley and the West Pilbara, with approximately two thirds of businesses implementing the practice. Approximately 45% of East Pilbara producers pregnancy test at least some groups of females each year. Only 20% of producers in the North Kimberley use the practice (Table 22). Pregnancy testing is most commonly carried out by either the manager or a veterinarian.

Table 22: Number of surveyed businesses that undertake annual pregnancy testing of breeders

District	All Breeders	Dry Cows	Cull Cows	Heifers	None
East Kimberley	1	5	5	5	6
North Kimberley	1	0	0	0	4
West Kimberley	1	11	7	8	9
East Pilbara	0	4	2	4	6
West Pilbara	3	7	3	6	7

Breeders are culled for a variety of reasons including temperament, pregnancy status, conformation and age (Table 23). The majority of businesses that cull based on age do so when a breeder reaches 10 years. Other reasons cited include horns, condition and colour. A small percentage of respondents do not cull any breeders.

Table 23: Culling criteria for breeders (n).

District	Temperament	Conformation	Pregnancy Status	Age	Other
East Kimberley	10	5	8	14	3
North Kimberley	2	1	1	1	2
West Kimberley	12	10	15	15	7
East Pilbara	8	7	4	8	1
West Pilbara	13	10	13	13	2

The proportion of surveyed businesses that spay cull cows prior to sale ranges from 65% in the West Pilbara to 20% in the North Kimberley. Figures for the East and West Kimberley and East Pilbara are 50%, 62% and 54% respectively. The most common methods of spaying are the dropped ovary technique, followed by webbing (Table 24).

Table 24: Percentage of businesses that spay cull cows prior to sale and the methods used (n)

		Method (n)		
	Cull cows spayed prior to sale (%)	Flank	Dropped Ovary	Webb
East Kimberley	50%	3	10	6
North Kimberley	20%	0	1	1
West Kimberley	62%	3	16	4
East Pilbara	54%	0	6	3
West Pilbara	65%	0	12	5

Mating strategies

Continuous mating is the most common management strategy implemented among surveyed businesses (Table 25). Controlled mating has not been widely adopted by those surveyed. The most common reasons for not implementing controlled mating are lack of available paddocks and difficulty controlling bulls. Twenty per cent of producers felt that the results of controlled mating do not justify the effort required.

Table 25: Number of properties surveyed that continuously mate classes of breeding cattle and total percentage of implementation for all properties surveyed

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara	% Implementing
Maiden Heifers	13	5	21	11	12	80%
1st Calf Heifers	13	5	23	11	15	87%
Breeders	14	5	23	11	15	88%

Bull management

The majority of bulls are sourced from Queensland studs in all districts except the North Kimberley, where surveyed producers predominantly breed their own replacement bulls. Home bred bulls also make up a significant proportion of bulls in other districts. A number of businesses in the Pilbara also source bulls from Western Australian studs (Table 26).

Table 26: Average percentage of bulls from different sources used on surveyed properties

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Breed your Own	35%	37%	17%	22%	18%
Commercial Breeders	1%	-	4%	9%	-
Within Company	-	-	-	-	11%
WA Stud	9%	19%	16%	19%	28%
NT Stud	7%	-	11%	-	-
QLD Stud	48%	19%	52%	41%	40%
Other	-	25%	-	9%	3%

Managed bull percentages (that is, number of bulls introduced per 100 breeders) of properties surveyed ranged from 3.4% in the West Kimberley to 6.5% in the East Pilbara (Table 27). Forty-three percent of managers believe that feral bulls are a significant problem in their herds.

Table 27: Managed bull percentages used in survey districts

District	Average Bull Percentage	Maximum Bull Percentage	Minimum Bull Percentage
East Kimberley	3.8%	5%	1%
North Kimberley	4.0%	4%	4%
West Kimberley	3.4%	5%	2%
East Pilbara	6.5%	20%	3%
West Pilbara	3.8%	6%	2.5%

Twenty-three percent of managers include Estimated Breeding Values (EBV) in their selection criteria when selecting replacement bulls, with fertility and growth rate considered the most important EBV traits. Other traits considered important when selecting bulls include structure and temperament. Polledness was also considered important, particularly in the West Pilbara (Table 28).

Table 28: Traits considered important by managers when selecting bulls – most managers consider more than one trait.

District	Temperament	Structure	Polled	Carcase Traits	Other
East Kimberley	13	17	5	2	2
North Kimberley	1	2	1	0	2
West Kimberley	19	23	10	1	2
East Pilbara	9	10	7	5	0
West Pilbara	17	17	14	2	1

Forty-six percent of managers have bulls assessed for breeding soundness prior to purchase, usually by the vendor. However, only 19% of these managers continue to conduct breeding soundness assessments after purchase.

Mustering

Helicopters were the most common mustering tool in all districts. Motorbikes and horses also played an important role, while trapping was common in the West Kimberley (Table 29). Mustering costs ranged from an average of $19.30/head in the West Kimberley to $27.83/head in the West Pilbara (Table 30). Mustering costs were calculated by the dividing the total cost of mustering by the number of head put through the yards in a season. Mustering costs were on average lowest on land managed as a sub-lease ($12.80/head) and highest on indigenous owned properties ($33.57/head).

Table 29: Mustering methods - most properties use more than one method.

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Helicopter	17	4	21	11	14
Motorbike	11	2	11	9	14
Horse	14	3	12	2	13
Trap Yards	6	0	10	2	3
Fixed Wing	2	0	1	2	6
Dogs	2	0	1	0	1
Buggies	5	2	5	10	7
Other	1	1	2	0	3
Total Surveyed	*18*	*5*	*26*	*11*	*17*

Table 30: Average and range of mustering costs ($ per head) for each survey district

District	Average Costs	Minimum Costs	Maximum Costs
East Kimberley	21.91	9.40	67.00
North Kimberley	38.65	24.30	53.00
West Kimberley	19.30	4.70	36.63
East Pilbara	21.79	12.80	37.00
West Pilbara	27.83	10.00	92.50

On average mustering starts in the East Kimberley in April, the North Kimberley, West Kimberley and East Pilbara in May and the West Pilbara in June. Mustering continues until December in the East Kimberley, September in the North Kimberley and West Pilbara, October in the West Kimberley and November in the West Pilbara. Fifty percent of Kimberley pastoralists, 18% of East Pilbara pastoralists and 35% of West Pilbara pastoralists conduct more than one mustering round each year. The East Kimberley and West Pilbara were the only districts where any respondents reported three mustering rounds per year (Table 31).

Table 31: Number of surveyed businesses conducting single and multiple mustering rounds in each survey district

	Number of mustering rounds		
	One	Two	Three
East Kimberley	5	9	1
North Kimberley	3	1	0
West Kimberley	14	10	0
East Pilbara	9	2	0
West Pilbara	9	6	2

Animal Health

Botulism was the most commonly occurring animal health problem across all survey areas Other health issues were more district specific. Cattle tick was considered by respondents to be more of a problem in the North Kimberley than in the east or West Kimberley and not at all in the Pilbara. Other common health issues were buffalo fly, vibriosis, phosphorus deficiency, and pink eye.

The most common disease which respondents vaccinate against is botulism, with the majority of producers using a long acting vaccine (Table 32). Vibriosis and clostridial diseases are also commonly vaccinated against. Most producers only vaccinate bulls against vibriosis however more than 20% of West Kimberley producers' vaccinated heifers and one property in the East Pilbara vaccinated all stock.

Table 32: Number of surveyed businesses vaccinating against common diseases

	Botulism	Clostridial Disease	Vibriosis	Red Water
East Kimberley	16	1	7	0
North Kimberley	3	1	0	0
West Kimberley	21	9	13	1
East Pilbara	9	3	4	0
West Pilbara	15	2	4	0

Animal health expenditure varied greatly between survey districts. The difference between the average spent and the maximum was also significant in all districts. The West Kimberley had both the highest average cost and also the highest maximum. This is possibly due to the high level of adoption of vaccinating against diseases and controlling parasites in this district (Table 33).

Table 33: Average and maximum amount spent per breeder on animal health treatments and vaccines by respondents in survey districts

District	Average	Maximum
East Kimberley	$1.95	$4.75
North Kimberley	$1.30	$3.00
West Kimberley	$4.49	$12.90
East Pilbara	$3.01	$6.50
West Pilbara	$2.21	$7.00

Supplementary feeding

Thirty percent of businesses surveyed don't feed any supplement. Of the managers surveyed who do feed supplement, 76% feed supplement every dry season and 28% supplement every wet season. Thirty-two per cent of Pilbara respondents and 6% of Kimberley respondents feed supplement only in bad years (Table 34).

Table 34: Number of surveyed businesses that feed supplement in different seasons

District	Dry Season	Bad Years Only	Wet Season
East Kimberley	9	3	3
North Kimberley	2	0	0
West Kimberley	19	0	9
East Pilbara	3	3	2
West Pilbara	8	6	2

Urea is the most common mineral fed in the dry season. In the Kimberley, dry season supplement is fed in either block or ready mix form, while in the Pilbara ready mix is most commonly fed (Table 35).

Table 35: Method of supplementation used by businesses surveyed.

District	Block	Home Mix	Ready Mix	Water Medicator
East Kimberley	7	1	10	0
North Kimberley	1	0	1	0
West Kimberley	9	2	9	3
East Pilbara	3	0	2	2
West Pilbara	4	1	9	2

Phosphorus is the most common mineral fed in the wet season in the Kimberley, with Pilbara respondents reporting they supplement urea and phosphorus and trace elements (Table 36).

Table 36: Types of supplement fed in the wet season by properties surveyed

Region	Urea	Urea & Phosphorus	Phosphorus	Trace Elements
Kimberley	0	0	11	1
Pilbara	1	2	0	1

The average cost of dry season supplement per head ranged from $6.98 in the East Pilbara to $14.92 in the West Pilbara. The average cost per head of feeding supplement in the wet season ranged from $2.50 in the West Pilbara to $9.63 in the West Kimberley (Figure 8).

In the Pilbara, producers tend to supplement all classes of stock, while in the Kimberley supplement is targeted towards weaners, heifers and cows (Tables 37 and 38).

Table 37: The number of surveyed businesses in each district that supplement different classes of animals in the dry season

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
All Stock	4	1	6	6	10
Weaners	7	0	9	0	3
Yearling Heifers	2	0	4	0	2
Breeding Heifers	4	1	8	0	4
Dry Cows	2	1	6	0	1
Wet Cows	3	1	8	0	2
Cull Cows	0	0	3	0	1
Yearling Steers	0	0	2	0	2
Sale Steers	0	0	4	0	2
Young Bulls	1	0	2	0	2
Breeding Bulls	0	1	0	0	2
Other	2	0	3	0	0

Table 38: The number of surveyed businesses in each district that supplement different classes of animals in the wet season

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
All Stock	0	0	1	2	3
Weaners	1	0	3	0	0
Yearling Heifers	2	0	3	0	0
Breeding Heifers	2	1	6	0	0
Dry Cows	1	1	5	0	0
Wet Cows	1	1	6	0	0
Cull Cows	0	0	1	0	0
Yearling Steers	1	0	1	0	0
Sale Steers	1	0	2	0	0
Young Bulls	0	0	3	0	0
Breeding Bulls	0	0	1	0	0
Other	0	0	1	0	0

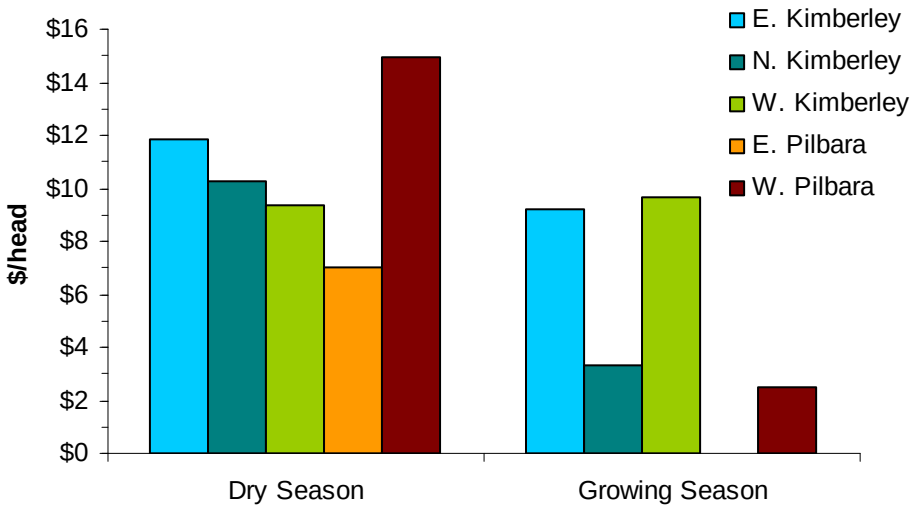

Figure 8: Average cost (2009) of dry season and wet season supplements per head for properties surveyed

Marketing and Sales

Females accounted for 34% of sales in the Kimberley in 2009. The majority of these were cows and heifers sold within Western Australia. The Western Australian slaughter market was the smallest sector for Kimberley sales in 2009, accounting for only 2% of sales. No steers or mickies were sold into this market, however three businesses sold aged cows. In comparison, females accounted for 40% of sales in the Pilbara in 2009. Heifers were evenly split between live export, slaughter and other destinations in Western Australia, while more cows were sold into Western Australia than were sold to live export (Table 39). A detailed breakdown of classes of cattle sold into the various markets can be found in Appendix 6.2.

Table 39: Surveyed properties' cattle sales summary for 2009 by region

	Kimberley 2009	Pilbara 2009
Total sales	198,453	55,144
Total males	131,529	33,349
Total females	66,924	21,795
% female sales	34%	40%
Slaughter	2,920 (2%)	3,160 (6%)

Sales figures quoted for 2010 do not reflect total sales for the year. When completing the survey, managers were asked to supply figures for the sales to date for 2010. The surveys were completed between July and December 2010. Therefore, some businesses may have sold cattle subsequent to the survey. Data collected for 2010 suggest that females accounted for 45% of sales in the Kimberley. The majority of these were aged cows being sold into both the live export and Western Australian market. Females accounted for approximately 52% of sales in the Pilbara in 2010 possibly reflecting herd reduction as a management strategy for the poor seasonal conditions experienced in many areas of the Pilbara in 2010 (Table 40).

Table 40: Sales summary to date at time of survey in 2010 (Survey completed between July and December)

	Kimberley 2010	Pilbara 2010
Total sales	145,098	26,023
Total males	80,414	12,559
Total females	64,684	13,464
% female sales	45%	52%
% female sales 2009/10	38%	43%
Slaughter	6,351 (4%)	773 (3%)

Live export was the major market for the East and West Kimberley in 2009. The majority of animals turned off were feeder steers. Slaughter steers and mickies also featured heavily in the live export market. No Kimberley cattle were sold through saleyards in 2009, although this market accounted for 8% and 18% of East and West Pilbara sales respectively (Table 41).

Live export accounted for approximately 56% of Pilbara sales in 2009, with the majority being slaughter steers. Again, the domestic slaughter market was the smallest sector for the Pilbara, accounting for approximately 6% of sales. The majority of these were heifers, followed by mickies.

Table 41: Average percentage of turnoff to different markets in 2009

District	Live Export	Feedlots	Saleyards	Restockers /Stores	Back-grounders	Abattoirs	Other
East Kimberley	78%	-	-	16%	6%	-	-
North Kimberley	25%	50%	-	-	-	-	25%
West Kimberley	85%	1%	-	5%	7%	2%	-
East Pilbara	83%	-	8%	7%	-	2%	-
West Pilbara	41%	13%	18%	8%	12%	8%	-

The south-east Asian market was the most important market in all districts, except the West Pilbara and North Kimberley. Respondents in the East Kimberley, West Kimberley and East Pilbara sold cattle into this market (78%, 85% and 82% respectively). Western Australia and the Middle East were also important markets in 2009. Eight out of 11 businesses in the East Pilbara and 10 out of 26 businesses in the West Kimberley sold cattle into the Middle East in 2009 (Table 42). In the West Pilbara, 16 out of 17 businesses surveyed sold cattle into the West Australian market. However, 11 businesses in the West Pilbara (65%) also sold cattle to south-east Asia. In the North Kimberley, only one business out of the five surveyed sold cattle to south-east Asia, while two businesses sold cattle into Western Australia and New South Wales. The remaining businesses in the North Kimberley did not turn off any cattle in 2009.

Table 42: Main markets for cattle from surveyed businesses in 2009. Many properties supply more than one market.

District	WA	Other Australian	SE Asia	Middle East	Company Supply Chain	*Total Surveyed*
East Kimberley	4	6	14	0	2	*18*
North Kimberley	2	2	1	0	0	*5*
West Kimberley	13	1	22	10	2	*26*
East Pilbara	8	2	9	8	0	*11*
West Pilbara	16	4	11	2	1	*17*

In 2010, the percentage of sales into the live export market were lower than 2009 in all districts except the North Kimberley. This may have been influenced by the 350 kg limit imposed by Indonesia, or simply a reflection of the incomplete figures due to the timing of the survey (Table 43).

Table 43: Average percentage of turnoff to different markets in 2010

District	Live Export	Feedlots	Saleyards	Restockers/Stores	Back-graunders	Abattoirs	Other
East Kimberley	54%	1%	-	31%	40%	9%	-
North Kimberley	75%	25%	-	-	-	-	-
West Kimberley	71%	1%	2%	7%	10%	9%	-
East Pilbara	56%	-	13%	25%	-	6%	-
West Pilbara	29%	15%	22%	18%	12%	3%	1%

The main turn-off period in the East Kimberley is from April to November. In the North Kimberley, cattle are turned-off between May and October, while in the West Kimberley sales can occur between March and December, with a peak occurring between May and September. Turn-off in the Pilbara mainly occurs in August and September, although sales can commence as early as March and continue until November (Figure 9).

More detailed information on cattle turn-off and markets can be found in Appendix 2.

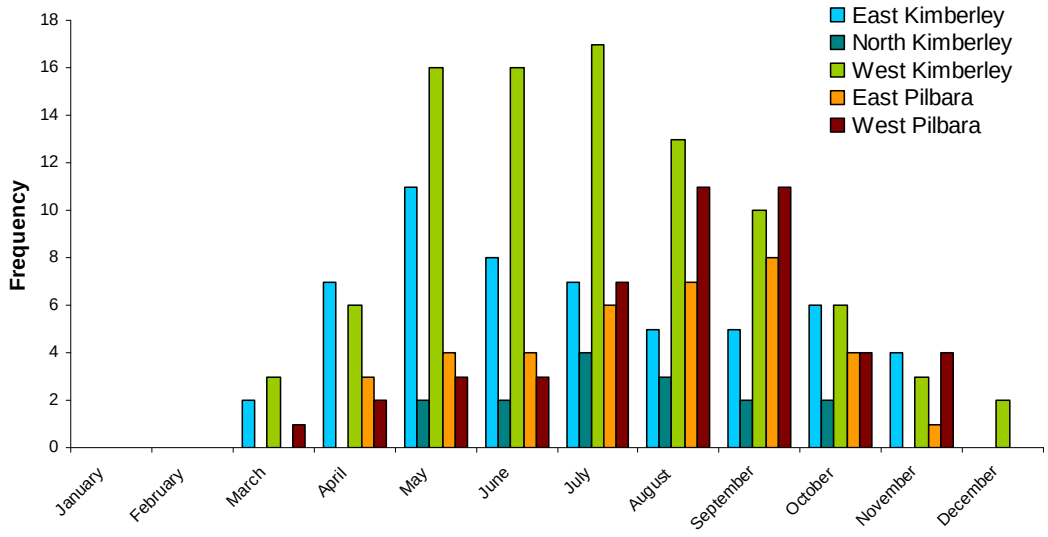

Figure 9: Main turn-off period by district

5.3 Grazing Management

Carrying Capacity

Respondents were asked to estimate the current carrying capacity of their properties with the current infrastructure and also what they expect it to be in five years time, taking into account their plans to develop infrastructure. Table 44 shows the current estimate of carrying capacity (2010) and an estimate of carrying capacity in 5 years time (2015). On average the survey respondents anticipate that their carrying capacity will increase by 16% across all districts in five years. The greatest expected increase was in the North Kimberley where the managers surveyed expect their carrying capacity to increase on average by 23%. The smallest increase over the five year period was recorded in the West Pilbara where respondents estimated an average 10% increase. These increases are expected though the development of new water points and fencing, allowing more complete and even utilisation of native pastures, rather than through pasture improvement.

Table 44: Surveyed managers' estimation of 2010 carrying capacity (head) and future carrying capacity (2015) for each of the survey districts

	Average estimated carrying capacity (head) 2010	Average estimated carrying capacity (head) 2015
East Kimberley	15793	18488
North Kimberley	4667	5750
West Kimberley	14965	16715
East Pilbara	10000	11773
West Pilbara	5431	5984

Ninety percent of producers surveyed indicated that they continually assess the availability of feed for stock. These assessments are carried out with a combination of the manager's assessment of the available feed and taking into account the condition of the cattle in the paddock. Formal assessment tools such as monitoring sites, grazing charts and food on offer assessments (FOO) are used, but by a minority of respondents (Table 45). Ninety-two percent of producers surveyed were confident in their ability to estimate the carrying capacity

of different landscapes on their property. Once an assessment of the feed availability has been made, adjustment of stocking rates was achieved by a combination of culling cows, early sale of steers and early weaning.

Table 45: Number of properties in each survey district using the described criteria to assess feed availability

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Monitoring Sites	5	0	3	2	0
Self Assessment	18	3	24	11	9
Grazing Charts	1	0	0	0	1
Condition of Stock	9	3	15	5	6
Measure FOO	0	0	2	0	2
None	0	2	0	0	0

Grazing Strategies

The predominant grazing strategy used on the properties surveyed was continuous grazing. Many respondents indicated that they use a combination of strategies, for example, the majority of the property may be continuously grazed but sections are spelled during the wet season or rotationally grazed. Spelling was popular in the East Kimberley and West Pilbara with 88% and 64% managers surveyed in these districts respectively employing this strategy (Table 46).

Table 46: Number of properties in each survey district that indicated that they use various grazing strategies (properties may utilise more than one strategy)

District	n	Rotational	Spelling	Continuous	Cell	Other
East Kimberley	18	5	16	16	1	3
North Kimberley	5	1	0	5	0	0
West Kimberley	26	8	15	22	0	1
East Pilbara	11	0	6	9	0	0
West Pilbara	17	4	11	13	1	0

The majority of producers surveyed (88%) believed that increasing the number of water points was an effective way to disperse cattle more evenly throughout a paddock. Other methods respondents used to disperse stock included fire, infrastructure and the location of supplements (Table 47).

Table 47: Number of properties in each survey district that indicated that they use methods other than water point location used to disperse cattle evenly through paddocks (properties may use more than one method)

District	Fire	Infrastructure	Location of supplements	Rotating water points	Piping water across paddocks	Other
East Kimberley	14	8	7	6	1	2
North Kimberley	2	1	2	0	0	0
West Kimberley	15	9	9	5	3	1
East Pilbara	8	4	1	1	3	0
West Pilbara	9	7	1	5	5	0

5.4 Natural Resource Management

Land monitoring

All Pilbara and Kimberley pastoral leases undergo some form of land condition assessment and monitoring as part of the legal requirements of holding a pastoral lease in Western Australia. Thirty percent of all properties surveyed undertake some other form of land monitoring. This may be associated with a land care or NRM program, a company program (i.e. mining or pastoral company policy) or some other program such as photo monitoring or feed on offer assessments. Table 48 shows the percentages of properties in each survey district that indicated that they undertake some form of land monitoring other than what is legally required.

Table 48: Percentages of properties in each survey district that indicated that they undertake some form of land monitoring other than what is legally required.

District	n	Landcare or NRM Program	Company Program	Other	Total
East Kimberley	18	0%	22%	17%	39%
North Kimberley	5	0%	0%	40%	40%
West Kimberley	26	0%	4%	8%	12%
East Pilbara	11	0%	0%	9%	9%
West Pilbara	17	12%	18%	29%	59%
Total	77	3%	10%	17%	30%

Pest Animals

Pest animals have a significant impact on pastoral businesses in the Pilbara and Kimberley regions. Respondents across the survey districts reported spending an average of $4,224 each year on controlling pest animals. West Kimberley properties had the highest average spend at $5,361 and the North Kimberley the lowest average at $3,300 (Table 49).

Table 49: Average annual cost of pest animal control per surveyed business by district.

District	Average Cost	Maximum Cost	Minimum Cost
East Kimberley	$4,394	$15,000	$0
North Kimberley	$3,300	$5,000	$500
West Kimberley	$5,361	$25,000	$200
East Pilbara	$3,818	$10,000	$1000
West Pilbara	$4,338	$10,000	$250

Survey respondents were asked to rate the impact of a range of pest animals on their properties. The responses varied depending on the location and the pest animal. Wild dogs were considered to cause a medium to high impact on more than 75% of properties in each survey district. East Pilbara producers reported the highest wild dog impact, with 91% of producers rating their impact as medium to high (Table 49).

Donkeys have the most significant impact on properties in the East Pilbara, where 36% of businesses surveyed consider them to have a high or medium impact. Interestingly, although the majority of producers in the North Kimberley and East Kimberley consider that

donkeys have little impact on their properties, 100% and 83% of these producers respectively attempt to control these pest animals.

Camels are a significant pest in the East Pilbara, with 80% of respondents from this district considering them to have a high or medium impact on their property. Horses have a significant impact on properties in the North Kimberley and the East Pilbara.

Kangaroos and wallabies are considered by more than 40% of producers to have a medium to high impact in each survey district except the North Kimberley. More than 80% of producers in the Kimberley surveyed do not attempt to control kangaroos or wallabies even though they consider them to have an impact on their businesses. By contrast, 66% of Pilbara producers who considered that kangaroos have some impact on their properties take action to control their numbers.

Feral pigs have more impact in the East and West Kimberley than in the other survey districts. This is due to the geographical distribution of feral pigs as they are not widely distributed in the Pilbara region (Table 50).

Table 50: The impact of pest animals on pastoral businesses (n) by survey district

		Impact			
District	**Pest**	**High**	**Medium**	**Low**	**N/A**
East Kimberley	Dogs	3	7	7	1
	Donkeys	6	0	0	12
	Camels	5	2	0	11
	Horses	5	0	0	13
	Kangaroos/Wallabies	5	4	6	3
	Pigs	2	2	1	13
	Other	1	0	0	2
North Kimberley	Dogs	1	0	4	0
	Donkeys	3	1	0	1
	Camels	0	0	0	5
	Horses	1	3	0	1
	Kangaroos/Wallabies	4	1	0	0
	Pigs	1	1	2	1
	Other	0	0	1	0
West Kimberley	Dogs	5	10	10	0
	Donkeys	9	0	0	15
	Camels	7	2	2	14
	Horses	10	2	0	13
	Kangaroos/Wallabies	12	5	5	3
	Pigs	3	8	1	13
	Other	2	1	0	1
East Pilbara	Dogs	1	4	6	0
	Donkeys	4	3	1	3
	Camels	2	6	2	0
	Horses	5	3	1	2
	Kangaroos/Wallabies	3	4	4	0
	Pigs	2	0	0	9
	Other	0	0	0	0
West Pilbara	Dogs	3	1	13	0
	Donkeys	8	1	2	6
	Camels	3	0	0	14
	Horses	7	0	1	9

	Kangaroos/Wallabies	5	6	5	1
	Pigs	0	0	0	17
	Other	0	1	0	0

In all districts except the North Kimberley, producers who consider that wild dogs have any impact on their business attempt to control them. In the North Kimberley, three of the five businesses surveyed attempt to control wild dogs (Table 51). This is possibly because the remaining two North Kimberley businesses surveyed do not run commercial beef herds.

Table 51: Number of businesses implementing feral animal control programs

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara
Wild Dogs	17	3	24	11	16
Donkey	5	4	5	7	6
Horses	5	1	5	5	3
Kangaroo/Wallaby	3	0	5	6	12
Pig	4	4	10	1	0
Other	0	1	3	0	1

Weeds

Across all survey districts, respondents estimated that six percent of their properties were affected by weeds. The highest percentage of land affected was reported in the West Pilbara and East Kimberley districts with 10% of property affected. The North Kimberley had the lowest average property area affected. The West Pilbara properties surveyed have the highest annual cost of weed control and the West Kimberley the lowest (Table 52). The weeds that had the highest impact on the properties surveyed across the Pilbara and Kimberley were Parkinsonia (*Parkinsonia aculeate*), mimosa bush (*Acacia farnesiana*), crotalaria (*Crotalaria spp*) and rubber bush (*Calotropis procera*) (Table 53). Fifty-two percent of managers surveyed actively attempt to control the introduction of weeds to their properties through measures such as feeding hay in designated areas, washing down vehicles and machinery or quarantining purchased animals prior to dispersing them on the property. Parkinsonia (*Parkinsonia aculeate*), rubber bush (*Calotropis procera*), mesquite (*Prosopis spp*) and bellyache bush (*Jatropha gossypiifolia*) are the weeds that the majority of survey respondents attempt to control (Table 54).

Table 52: Average percentage of property area affected by weeds and the average annual cost of weed control for each survey district

District	% Property Affected	Average Cost	Maximum Cost	Minimum Cost
East Kimberley	10%	$11,169	$5,000	$0
North Kimberley	1%	$3,600	$6,000	$0
West Kimberley	3%	$2,596	$10,000	$0
East Pilbara	6%	$12,721	$8,000	$0
West Pilbara	10%	$23,214	$18,000	$0
Average	6%	$10,660		

Table 53: Relative impact of various weeds across the Kimberley and Pilbara

	Impact			
Weed	**Low**	**Medium**	**High**	**Unsure**
Barleria (*Barleria prioritis)*	0	0	0	100
Bellyache bush (*Jatropha gossypifolia)*	39	6	28	28
Chinee apple (*Ziziphus maurtiana)*	67	0	0	33
Crotalaria (*Crotalaria spp)*	52	23	23	3
Gamba grass (*Andropogon gayanus*)	75	0	0	25
Grader grass (*Themeda quadrivalvis)*	47	13	20	20
Hyptis (*Hyptis suaveolens)*	79	0	7	14
Lantana (*Lantana camara)*	0	0	0	0
Mesquite (*Prosopis pallida)*	62	0	23	15
Mimosa (*Mimosa pigra)*	100	0	0	0
Mimosa bush (*Acacia farnesiana)*	47	24	24	6
Mission grass (*Pennisetum spp)*	50	0	17	33
Noogoora burr (*Xanthium occidentale)*	53	13	33	0
Parkinsonia (*Parkinsonia aculeate)*	44	36	21	0
Parthenium (*Parthenium hysterophorus)*	0	0	0	0
Prickly acacia (*Acacia nilotica)*	80	20	0	0
Rubber bush (*Calotropis procera)*	52	26	16	6
Rubber Vine (*Cryptostegia grandiflora)*	100	0	0	0
Senna (*Senna spp)*	60	20	10	10
Sida (Sida spp)	47	41	0	12

Table 54: Number of businesses attempting to control weeds by survey district

	East Kimberley	**North Kimberley**	**West Kimberley**	**East Pilbara**	**West Pilbara**
Bellyache bush (*Jatropha gossypifolia)*	6	1	2	1	0
Crotalaria (*Crotalaria spp)*	1	0	0	1	0
Gamba grass (*Andropogon gayanus*)	0	1	0	0	0
Grader grass (*Themeda quadrivalvis)*	0	3	0	0	0
Hyptis (*Hyptis suaveolens)*	0	1	2	0	0
Mesquite (*Prosopis pallida)*	1	0	4	1	6
Mimosa bush (*Acacia farnesiana)*	4	0	2	1	1
Noogoora burr (*Xanthium occidentale)*	3	0	3	0	0
Parkinsonia (*Parkinsonia aculeate)*	9	1	9	4	6
Prickly acacia (*Acacia nilotica)*	4	1	0	0	1
Rubber bush (*Calotropis procera)*	4	0	5	4	0
Rubber Vine (*Cryptostegia grandiflora)*	0	0	3	1	0
Senna (*Senna spp)*	2	0	0	0	0
Sida (Sida spp)	1	0	3	0	0

5.5 Extension of Information

Producers' surveyed use a variety of sources to gain information about the pastoral industry. The majority of producers utilise publications, DAFWA extension staff, other producers and the internet. Of the available publications respondents read the DAFWA Pastoral Memo, West Australian and interstate rural newspapers and MLA publications.

Respondents were asked to rate the effectiveness of DAFWA's extension methods. They considered that the most effective forms were one on one visits followed by training workshops and field days.

Training workshops were considered to be an effective learning environment and respondents were interested in attending a range of courses. Animal health and nutrition and breeder herd management were the top training areas requested with grazing land management, business management and pasture monitoring also well considered.

Respondents who had attended training courses in the past three years had generally made some change to their management as a result. Twelve producers in the Kimberley had attended a business management workshop and 11 had subsequently made some changes to the way they manage. Similarly, nine of the ten producers that attended the Grazing Land Management workshop in the Kimberley put some of what they learnt into action.

Appendix 3 contains more detailed information about producers' responses to questions about where they access information and what training is of greatest interest.

6. Appendices

6.1 Appendix 1 – Survey Questionnaire

2010 Kimberley and Pilbara Pastoral Industry Survey

1 Ownership and Management

1.1 District

☐ East Kimberley ☐ North Kimberley ☐ West Kimberley

☐ East Pilbara ☐ West Pilbara ☐ Other _____

1.2 How is the property ownership/management structured? Please tick one

☐ Company / Manager ☐ Indigenous Owned Land ☐ Owner / Manager

☐ Private owned / Manager ☐ Private / Lessee ☐ Private / Agistor

☐ Other _____

1.3 Is the station run:

☐ Individually ☐ As part of an integrated production system

1.4 How long has the current owner had the property? _____ years

1.5 How long has the current manager been in the position? _____ years

1.6 How many people are employed? Seasonally _____ Permanently _____

1.7 a) Are there any other enterprises/operations on the property? ☐ Yes ☐ No

b) If yes,

☐ Mining ☐ Horticulture ☐ Hay production

☐ Tourism ☐ Mixed Farming

☐ Other _____

1.8 Are operations limited by staff availability/turnover?

☐ Yes ☐ No

1.9 Have you taken any action to install, or do you use, any new labour saving devices?

☐ Remote water monitoring ☐ Trap gates ☐ Hydraulic crush

☐ Laneways ☐ Other _____

1.10 How is labour sourced?

☐ Recruitment agencies ☐ Internal recruitment ☐ Word of mouth

☐ Newspaper ads ☐ Rural college ☐ Online advertising

☐ Other _____

1.11 (a) Does staff training occur? ☐ Yes ☐ No

b) If yes, please list what sort:

☐ Formal accredited courses e.g. Cert I – IV through TAFE

☐ Formal non-accredited courses e.g. DAFWA, EDGEnetwork courses

☐ Informal training e..g on-the-job

☐ Other _____

c) If yes, what topics:

☐ Livestock handling ☐ Horsemanship ☐ Preg testing

☐ Bull selection ☐ BreedingEDGE ☐ NutiritonEDGE

☐ Business management ☐ Grazing Land Management ☐ Rangeland management

☐ Monitoring and carrying capacity assessments

☐ Other _____

1.12 Is the property business financed with:

☐ Major trading bank, interstate branch ☐ Agricultural/Corporate bank (e.g Rabobank)

☐ Major trading bank, WA branch ☐ Agribusiness (e.g. Landmark or Elders)

☐ N/A ☐ Other _____

1.13 a) Do you have a documented property management plan? ☐ Yes ☐ No

b) If yes, which of the following does it include?

☐ Financial Management ☐ Sustainable production systems

☐ Human resource management ☐ Natural resource management

1.14 Do you use any financial or production benchmarks to help your management?

☐ Yes ☐ No

1.15 a) Do you use benchmarks to assist in managing your natural resources? ☐ Yes ☐ No

b) If yes, what benchmarks do you use?

☐ Photo monitoring sites ☐ Pasture yield assessments ☐ Rainfall records

☐ Grazing records ☐ Weed maps ☐ Veg Machine

☐ DAFWA lease inspections ☐ Other

c) If no, do you think it would be useful? ☐ Yes ☐ No

2 Property and Improvements

Please note: the following questions relate to the 'management unit', i.e. if two properties are run as one unit, take both properties into account when answering questions.

2.1 What is the total area of the property? _____ ha _____ km^2

2.2 What area is currently used for:

Grazing_____ ha _____ km^2

Hay Production/cropping _____ ha _____ km^2

Other _____ ha _____ km^2

2.3 How many paddocks do you have? (Do not include small holding paddocks etc)_____

2.4 What is the average size of your paddocks?_____ ha _____ km^2

Largest paddock ____ ha____ km^2

Smallest paddock ____ ha ____ km^2

2.5 a) How many yards do you have? Permanent _____ Trap _____

Portable _____ Other _____

b) How many portable yard sites do you have? _____

c) Of these portable yard sites, how many have the following:

Holding/mothering up paddocks _____

Some permanent yard facilities (crush, loading ramp, etc) _____

Access to water for stock _____

2.6 a) Approximately how many permanent watering points do you have?

Natural _____(Numerous code 101) Bores _____ Dams _____

b) How many waters are equipped with:

Solar powered pumps _____ Windmills _____

Diesel or petrol powered pumps _____ Water medicators _____

Electronic monitoring systems _____ Dams _____ Other_____

2.7 What proportion of the property is boundary fenced or effectively enclosed? _____ %

2.8 Of the following, which do you use to help make management decisions or to assist in the day to day operations?

☐ Email ☐ Excel ☐ Internet

☐ Bureau of Meteorology

☐ Fire Scar & Hot Spot websites

☐ Electronic ID of animals

☐ Remote water point monitoring

☐ Electronic book keeping e.g MYOB, Agrimaster,etc

☐ Electronic herd, animal records eg Stockbook

☐ Herd Modelling Programs (eg Breedcow Dynama)

☐ Recording Programs (eg PAM, PinPoint)

☐ Other _____

2.9 Please rank your highest three priorities for infrastructure development:

(1 highest priority – 3 lowest priority)

☐ Paddock subdivision	☐ Fencing	☐ Water point development
☐ Drafting yards	☐ Trap yards	☐ Laneways
☐ Accommodation	☐ Roads	☐ Sheds

☐ Telemetry for monitoring waters

☐ Other _____

2.10 What infrastructure development do you intend to undertake in the next year?

☐ Paddock subdivision	☐ Fencing	☐ Water point development
☐ Drafting yards	☐ Trap yards	☐ Laneways
☐ Accommodation	☐ Roads	☐ Sheds

☐ Telemetry for monitoring waters

☐ Other _____

3 Reproduction and Herd Management

3.1 Which best describes your cattle enterprises?

☐ Breed and sell mainly live export feeder cattle

☐ Breed & sell or transfer cattle for growing elsewhere in Australia

☐ Breed and sell mainly slaughter cattle

☐ Growing/finishing transferred/purchased cattle

☐ Other _____

3.2 If growing/finishing purchased/transferred cattle, how many head did you put through for the 12 months ending at 31/12/2009?

_____ head (Cattle introduced + cattle sold/transferred out)

3.3 How many head and how many breeders did you have as at 31/12/2009?

_____ head and _____ breeders

3.4 a) What types of animals did you turn off in 2009?

	Average weight	Average age	Numbers
Feeder steers – live export			
Slaughter steers – live export			

Feeder steers – WA/NT			
Slaughter steers – WA/NT			
Mickies – live export			
Mickies – WA/NT			
Mickies - slaughter			
Bulls – live export			
Bulls - slaughter			
Bulls- WA/NT			
Heifers - slaughter			
Heifers – live export			
Heifers – WA/NT			
Cows – live export			
Cows – WA/NT			
Cows - slaughter			
Other			

3.4 b) What types of animals did you turn off in 2010 to date?

	Average weight	Average age	Numbers
Feeder steers – live export			
Slaughter steers – live export			
Feeder steers – WA/NT			
Slaughter steers – WA/NT			
Mickies – live export			
Mickies – WA/NT			
Mickies - slaughter			
Bulls – live export			
Bulls - slaughter			
Bulls- WA/NT			
Heifers - slaughter			
Heifers – live export			
Heifers – WA/NT			
Cows – live export			
Cows – WA/NT			
Cows - slaughter			
Other			

3.5 What % of your turnoff went to the following markets in 2009 and 2010 to date?

	2009	2010 to date
Live Export		
Feedlots		
Saleyards		
Re-stockers/Stores		
Backgrounders		
Abattoirs		
EU		
Organic		
Other		

3.6 Where were your main three markets located in 2009?

☐ WA ☐ NT ☐ QLD ☐ SA

☐ South East Asia ☐ Middle East ☐ Company Supply Chain ☐ NSW

☐ Other _____

3.7 Please estimate the marking/weaning and mortality rates for the following classes of females averaged for the last two years:

	Estimated wean %		Estimated mortality % (% that die annually)	
	2008	2009	2008	2009
Weaner heifers	N/A	N/A		
Maiden heifers				
1st calf heifers				
Breeders				
Old cows				

3.8 What mustering methods do you use?

☐ Helicopter ☐ Motorbike ☐ Horse ☐ Buggies

☐ Trap Yards ☐ Fixed Wing ☐ Dogs

☐ Other _____

3.9 What is the predominant breed of your herd?

☐ Brahman ☐Brahman X ☐ Shorthorn ☐ Shorthorn X

☐ Droughtmaster ☐ Santa Gertrudis ☐ Multi-breed ☐ Other _____

3.10 What is your main breeding goal?

☐ To upgrade to Brahman ☐ To select traits within breed

☐ Upgrade to other tropical breed ☐ To cross breed to suit market

☐ To cross breed for improved herd performance ☐ To make composite breed

☐ Concentrating on management, not genetics

☐ Other _____

3.11 What percentage of bulls do you source from?

Breeding your own _____Commercial breeders _____Within company _____

WA stud breeders _____ NT stud breeders _____ Qld stud breeders _____

NSW stud breeders _____ SA stud breeders _____ Other _____

3.12 What bull percentage do you aim to run? _____ %

Do you have a significant problem with feral bulls?

☐ Yes ☐ No

3.13 a) Do you use Estimated Breeding Values when selecting bulls?

☐ Yes ☐ No

b) If yes, rank the two traits that are most important to your breeding program:

☐ Fertility ☐ Growth Rate ☐ Birth Weight

☐ Other _____

c) What other traits do you use when selecting bulls?

☐ Temperament ☐ Structure ☐ Polled ☐ Carcase traits

☐ Other _____

3.14 a) Do you have bulls assessed for breeding soundness? ☐ Yes ☐ No

b) If yes, how often?

☐ Before purchase ☐ Once every _____ years

3.15 What method of dehorning do you practice?

☐ Run mostly poll cattle ☐ Don't dehorn ☐ Complete dehorn at maturity

☐ Complete dehorn at branding/weaning ☐ Tip dehorn

☐ Other _____

3.16 What tools do you use for dehorning?

☐ Dehorning knife ☐ Scoops ☐ Gas dehorners

☐ Hydraulic/pneumatic dehorners ☐ Don't dehorn ☐ Run mostly poll cattle

☐ Other _____

3.17 a) Do you wean? ☐ Yes ☐ No

b) If yes, how do you wean?

☐ Age ☐ Set weight each year _____kg

☐ Different weight each year according to environmental conditions

c) What minimum weight have you weaned down to?

In a 'normal year' _____ kg In a 'bad year' _____ kg

3.18 a) What feeding strategy do you use for weaners?

☐ Short term feeding in yards with concentrate ☐ Put on spelled pasture

☐ Short term feeding in yards with hay ☐ Feed throughout dry season

☐ None

☐ Other _____

3.19 Do you segregate breeders by any of the following options:

☐ Age ☐ Pregnancy status ☐ Colour ☐ Condition

☐ Other _____

3.20 Is preg testing normal yearly practice?

☐ Yes – for all cows ☐ Yes – for dry cows ☐ Yes – for cull cows

☐ Yes – for heifers ☐ No

If yes, who undertakes the preg testing on your station?

☐ Yourself ☐ Vet ☐ Employee

☐ Hire a qualified preg tester

3.21 Do you AI or embryo transfer?

☐ Yes – for stud cattle ☐ Yes – for commercial cattle ☐ No

3.22 Do you individually identify all stock? (Able to identify/record individual animal data)

☐ Yes – with tags ☐ Yes – with EID

☐ Yes – with EID ear tag and management tag ☐ Yes – with bolus ☐ No

3.23 a) What class of stock do you year brand/tag?

☐ All stock ☐ Females only ☐ Males only ☐ No

b) What method do you use?

☐ Calendar year ☐ Financial year

3.24 What determines when breeders are culled?

☐ Temperament ☐ Conformation ☐ Age What age _____

☐ Pregnancy diagnosis status ☐ Other _____

3.25 a) Are cull cows spayed prior to sale? ☐ Yes ☐ No

b) What method of spaying is used?

☐ Flank ☐ Dropped ovary ☐ Webb

☐ Other _____

3.26 How many breeder mustering rounds do you do per year and when do you do them?

	Start month	Finish month
Round 1		
Round 2		
Round 3		

3.27 What were your mustering costs for last year? _____ $/head
(complete table) (Total costs/total cattle mustered during the year)

3.28 When is your major turn off period?

☐ All year

☐ January ☐ February ☐ March ☐ April ☐ May ☐ June

☐ July ☐ August ☐ September ☐ October ☐ November ☐ December

3.29 a) Do you feed mineral supplement? ☐ Yes ☐ No

If yes, when do you feed mineral supplement?

(b) ☐ Every dry season ☐ Every growing season

☐ Bad years only Specific months _____

Dry Season

c) What stock do you supplement in the dry season?

☐ All stock ☐ Weaners ☐ Yearling heifers ☐ Breeding heifers ☐ Dry adult breeders ☐ Wet adult breeders ☐ Cull cows

☐ Yearling steers ☐ Sale steers ☐ Young bulls ☐ Breeding bulls

☐ Other _____

d) What form of supplement do you feed in the dry season?

☐ Block ☐ Loose mix-home mixed ☐ Loose mix-readymix ☐ Water medicators

e) What is the main mineral you supplement in the dry season? _____

Growing season

f) What stock do you supplement in the growing season?

☐ All stock ☐ Weaners ☐ Yearling heifers ☐ Breeding heifers

☐ Dry adult breeders ☐ Wet adult breeders ☐ Cull cows

☐ Yearling steers ☐ Sale steers ☐ Young bulls ☐ Breeding bulls

☐ Other _____

g) What form of supplement do you feed in the growing season?

☐ Block ☐ Loose mix-home mixed ☐ Loose mix-readymix ☐ Water medicators

h) What is the main mineral you supplement in the growing season? _____

3.30 What was the cost of supplement last year?

Dry season $ _____ /head

Growing season $ _____ /head

3.31 a) Have you produced your own hay in the last twelve months? ☐ Yes ☐ No

b) If yes, how many tonnes _____ tonnes

c) Was it native or improved pasture? ☐ Native ☐ Improved

Heifer Management Section

3.32 How many heifers did you keep as breeder replacements in the last two years?

2008	
2009	

3.33 At what age/s do you select your replacement heifers?

Tick as many boxes as necessary

☐ At weaning ☐ Before joining ☐ Preg test after mating

☐ Weaning time of first calf

☐ Other _____

3.34 Rate the importance of each of the following criteria in selecting your replacement heifers?
(1-5 where 1 = not important, 3 = medium importance, 5 = extremely important)

Weight	1 2 3 4 5
Conformation	1 2 3 4 5
Type	1 2 3 4 5
Temperament	1 2 3 4 5
Colour	1 2 3 4 5
Fertility (if you select after joining them all for the 1st time)	1 2 3 4 5
Other _____	1 2 3 4 5

3.35 a) Do you segregate your heifers from your breeders following weaning? ☐ Yes ☐ No

b) If you do, up until what age do you keep them segregated?

☐ Until start of 1st joining ☐ Until start of 2nd joining ☐ After weaning of first calf

☐ Other _____

c) If you don't segregate heifers from breeders following weaning what are the reasons? Tick as many as necessary

☐ Not enough paddocks ☐ Too much labour required ☐ Don't believe it is worth it
☐ Other _____

3.36 What is the approximate age range of your heifers when you join them for the first time? Please indicate % in each box

<12 months	12 – 18 months	18 – 24 months	>24 months

3.37 What is the weight range of your heifers when you join them for the first time?

Please indicate % in each box

<200kg	200 – 250kg	250 – 300kg	>300kg

3.38 a) Do you weigh heifers at any stage prior to joining them? ☐ Yes ☐ No

b) If yes, please indicate when do you weigh them? Tick as many as are applicable

☐ At weaning ☐ 12 – 18 months ☐ Before joining

3.39 What vaccinations do you give to your heifers? Tick as many as necessary

Vaccine	At weaning	At Joining	Yearly at muster (older animals)	Other
Botulism				
Lepto				
5 in 1				
7 in 1				
Vibrio				
Pesti virus				
Other (Please specify) _____				

3.40 What age of bulls do you prefer to mate to your heifers?

☐ < 3 years old ☐ Average of herd bulls ☐ AI

☐ Other _____

3.41 Do you vaccinate your bulls against any diseases, and how often?

Vaccination	Annually	Other
Vibrio	☐	_____
3 day sickness	☐	_____
Botulism	☐	_____
Other _____	☐	_____

3.42 Please fill in the table to describe the current joining management for your breeder herd, i.e. do you use continuous (bulls stay in all year) or controlled (bulls removed for a time) joining?

	Continuous mating	or Controlled mating	
		Start (month)	End (month)
Maiden heifers (1st joining)			
1st calf heifers (2nd joining)			
Breeders			

3.43 a) If you don't use control mating, what are the reasons? Tick as many as necessary

☐ Bull control problem ☐ Insufficient paddocks

☐Too much labour ☐ Results don't justify effort

☐ Other _____

3.44 What is/are the most important factor/s influencing the time of year that you wean the calves from your heifers?

☐ Condition of heifers ☐ Access to heifers ☐ Time of year ☐ Mustering practises

☐ Effect of lactation on heifers ☐ Pasture condition ☐ Labour availability

☐ Other _____

3.45 How important do you consider the following strategies are in improving heifer performance?
Please place a tick in box if used and circle a number to indicate importance
(1-5 where 1 = not important, 3 = medium importance, 5 = extremely important)

Managing young heifers separate from breeders	☐	1 2 3 4 5
Preventing out of season pregnancies (bull control)	☐	1 2 3 4 5
Improving joining weights through supplementation	☐	1 2 3 4 5
Improving joining weights through use of better paddocks	☐	1 2 3 4 5
Vaccination against disease	☐	1 2 3 4 5
Time of year that weaning occurs	☐	1 2 3 4 5
Early weaning of calves from heifers	☐	1 2 3 4 5
Mating heifers for the first time as “yearlings”	☐	1 2 3 4 5
Use of pregnancy testing	☐	1 2 3 4 5
Bull fertility testing.	☐	1 2 3 4 5
Bull percentage used at mating	☐	1 2 3 4 5
Age of bulls used	☐	1 2 3 4 5
Genetics/selection for fertility	☐	1 2 3 4 5

4 Grazing Management

4.1 What is your estimate of the carrying capacity of the property with current infrastructure
_____ head

4.2 How do you adjust stocking rates during the dry season?

☐ Cull cows ☐ Early weaning ☐ Early sale of steers

☐ Do nothing ☐ Destock

☐ Reduce numbers to match carrying capacity

b) What indicators do you use to assess feed availability?

☐ Monitoring sites e.g. WARMS ☐ Self assessment ☐ Grazing charts

☐ Look at condition of the stock ☐ Measure food on offer ☐ None

c) How often do you assess feed availability?

☐ End of growing season ☐ Continual ☐ Twice a year

☐ Once a year ☐ In a drought ☐ Never

4.3 Can you estimate the carrying capacity of the different land types you have and/or rank them?

☐ Yes ☐ No

4.4 With your current plans for infrastructure development, what will your carrying capacity be in:

a) 5 years time _____ head

4.5 a) Have you chosen to permanently exclude any areas of your property from grazing?

☐ Yes ☐ No

b) If yes, what areas and why?

☐ Conservation reasons ☐ Not economic to develop ☐ Too difficult to muster

☐ Unsuitable for grazing ☐ Drought reserve

☐ Other_____

c) If no, would you consider it in the future? ☐ Yes ☐ No

4.6 What is the upper limit of distance from water that you plan infrastructure around? ____ km

4.7 a) Do you think increasing water points is sufficient to disperse cattle more evenly through a paddock? ☐ Yes ☐ No

b) What other methods do you use?

☐ Fire ☐ Infrastructure ☐ Supplement points

☐ Rotating water points ☐ Pipelines

☐ Other _____

4.8 What grazing strategies do you use?

☐ Rotational grazing ☐ Spelling

☐ Continuous grazing ☐ Time control/cell grazing

☐ Other _____

4.9 Have you noticed a build up of native shrubs or trees in your native pastures?

☐ Yes- on black soil ☐ Yes – on red soil

☐ Yes – as regrowth on previously cleared areas ☐ Yes – on river flats

☐ Yes - on cracking clays ☐ Yes – Other

☐ No

4.10 What proportion of the property was affected by fire in the previous twelve months?

a) Wildfire _____ % b) Intentional _____ %

4.11 What are the different ways you use fire to manage your property?

Reason	Time of year e.g. early dry season	Fire intensity (e.g. hot, cool)	Frequency	% of paddock
Wildfire mitigation				
Control grazing distribution				
Improve diet quality				
Manage pasture species composition				
Control exotic weeds				
Manage tree-grass balance				
Maintaining biodiversity				
Other _____				

4.12 a) Do you have areas of introduced pasture or crops on your property? ☐ Yes ☐ No

b) If yes, approximately how much with each of the following:

Irrigated pasture _____ ha Please specify species _____

Non-irrigated pasture _____ ha Please specify species _____

Crop _____ ha Please specify species _____

4.13 a) Would you like to introduce or increase the area of introduced pasture or crops on your property in the next three years? ☐ Yes ☐ No

b) If yes, approximately how much with each of the following:

Irrigated pasture _____ ha Please specify species _____

Non-irrigated pasture _____ ha Please specify species _____

Crop _____ ha Please specify species _____

4.14 Are you concerned about the unwanted spread of any of the following introduced pasture species in your district?

☐ Leucaena ☐ Stylos ☐ Other legumes _____

☐ Buffel grass ☐ Gamba grass ☐ Other grasses _____

4.15 a) Do you produce hay? If no, go to Section 5

☐ Yes ☐ No

b) If yes, for what purpose?

☐ Own use ☐ For sale to pastoral ☐ For sale to processing ☐ Sale to other

4.16 Approximately, what do you spend on fertiliser for hay per hectare?

☐ $0 - $24 ☐ $25 - $49 ☐ $50 - $99 ☐ $100 or more

4.17 What do you think are the main issue/s affecting hay production?

Please prioritise your responses with 1 representing the main issue

__ Weed Invasion
__ Transport
__ Lack of alternative market options
__ Cost of production
__ Pricing on quality
__ Payment
__ Competition from overseas/interstate
__ Weather variability
__ Difficulty of obtaining diversification permit/legislation
__ Quantity and quality of water available
__ Other _____

4.18 a) Have you implemented a weed management plan for hay production? ☐ Yes ☐ No

b) If yes, is it:

☐ A formal document ☐ In your head ☐ Part of a pastoral management plan

4.19 What are the main factors limiting your expansion of hay production? Please list in order of priority

__ Time
__ Lack of machinery
__ Lack of suitable areas
__ Cost of inputs
__ Legislation
__ Weeds
__ Other _____

4.20 How would you improve your hay production practices?

Please list in order of priority

a) _____

b) _____

c) _____

d) _____

5 Animal Health

5.1 How much per breeder do you spend on animal health treatments and vaccines?

$ _____ (Total cost/number of breeders)

5.2 What are the two most common animal health problems occur in your herd?

☐ Cattle tick
☐ Buffalo fly
☐ Botulism
☐ Prolapse
☐ 3 day sickness
☐ Clostridial diseases
☐ Vibrio (Camplyobacteriosis)
☐ Red water
☐ Phosphorous deficiency
☐ Dystocia
☐ Tail rot
☐ Pink eye
☐ Tetanus
☐ Other_____

5.3 a) What diseases do you vaccinate against?

☐ Botulism ☐ Clostridial diseases ☐ Vibrio (Camplyobacteriosis)

☐ Red water ☐ 3 day sickness (BEF)

☐ Other_____

If you vaccinate for Botulism:

b) do you use: ☐ Long acting vaccine ☐ Conventional (annual) vaccine

c) how often? ☐ Every year ☐ Less than once every year

d) If using a conventional (annual) vaccine do you vaccinate twice, 6- 8 weeks apart?

☐ Yes ☐ No

If you vaccinate for Vibrio:

d) do you vaccinate: ☐ Bulls ☐ Heifers ☐ All stock

e) how often? ☐ Every year ☐ Less than once every year

5.4 a) What chemicals are used on your stock? Please specify

☐ None

☐ Worming _____

☐ Fly control _____

☐ Lice control _____

☐ Tick control _____

☐ Wound antisepsis _____

☐ Growth promotant _____

☐ Other _____

b) Are there any specific animal health issues that you have?

_____

5.5 Do you know the procedure to follow if you suspect an outbreak of an emergency animal disease? ☐ Yes ☐ No

5.6 Do you use NLIS readers? ☐ Yes ☐ No

5.7 Do you plan to use NLIS tags as a management tool in the future? ☐ Yes ☐ No

6 Natural Resource Management

6.1 Do you do any form of documented land monitoring, apart from legal requirements?

☐ Yes – Landcare or NRM program ☐ Yes - Company program ☐Yes – Other

☐ No

6.2 Please indicate which of the following you believe is relevant to improve natural resource management in the industry and whether you have undertaken any action in the previous twelve months:

Biodiversity conservation	☐ Relevant	☐ Taken action
Carbon credit systems	☐ Relevant	☐ Taken action
Organic accreditation	☐ Relevant	☐ Taken action
Improved animal welfare	☐ Relevant	☐ Taken action
Eco-tourism	☐ Relevant	☐ Taken action
Location of water points	☐ Relevant	☐ Taken action
Quality Assurance Scheme i.e. cattle care	☐ Relevant	☐Taken action

6.3 Please rate the impact of the following pest animals on your property:

Wild dogs	☐ Low	☐Medium	☐ High	☐ N/A
Donkey	☐ Low	☐ Medium	☐ High	☐ N/A
Camel	☐ Low	☐ Medium	☐ High	☐ N/A
Horses	☐ Low	☐Medium	☐ High	☐ N/A
Kangaroos/wallabies	☐ Low	☐ Medium	☐ High	☐ N/A
Pigs	☐ Low	☐ Medium	☐ High	☐ N/A
Other _____	☐ Low	☐ Medium	☐ High	☐ N/A

6.4 Do you attempt to control any of the following pest animals on your property?

☐ Wild dogs ☐ Donkey ☐ Camel ☐ Horses

☐ Kangaroo/wallabies ☐ Pig ☐ Other

6.5 Please rate the impact of the following weeds on your property

Barleria *Barleria prioritis*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Bellyache bush *Jatropha gossypifolia*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Chinee apple *Ziziphus maurtiana*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Crotalaria *Crotalaria spp*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Gamba grass *Andropogon gayanus*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Grader grass *Themeda quadrivalvis*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Hyptis *Hyptis suaveolens*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A

Lantana *Lantana camara*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Mesquite *Prosopis pallida*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Mimosa *Mimosa pigra*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Mimosa bush *Acacia farnesiana*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Mission grass *Pennisetum spp*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Noogoora burr *Xanthium occidentale*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Parkinsonia *Parkinsonia aculeata*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Parthenium *Parthenium hysterophorus*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Prickly acacia *Acacia nilotica*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Prickly pear *Opuntia spp*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Rubber bush *Calotropis procera*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Rubber vine *Cryptostegia grandiflora*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Senna *Senna spp*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Sida *Sida spp*	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A
Other _____	☐ Low	☐Medium	☐ High	☐ Unsure	☐ N/A

6.6 a) Do you do anything to prevent the introduction of weeds onto your property?

☐ Yes ☐ No

b) If yes, what?

☐ Quarantine machinery and equipment ☐ Wash-down bays

☐ Feed out purchased hay in designated areas ☐ Buy certified hay/seed

☐ Restrict access of off-property machinery and vehicles ☐ Use own hay

☐ Quarantine animals purchased off-property ☐ Other _____

6.7 Do you attempt to control any of the following weeds on your property?

☐ Barleria ☐ Bellyache Bush ☐ Chinee apple ☐ Crotalaria

☐ Gamba grass ☐ Grader grass ☐ Hyptis ☐ Lantana

☐ Mesquite ☐ Mimosa ☐ Mimosa bush ☐ Mission grass

☐ Nogoora burr ☐ Parkinsonia ☐ Parthenium ☐ Prickly acacia

☐ Prickly Pear ☐ Rubber bush ☐ Rubber Vine ☐ Senna

☐ Sida ☐ Other _____

6.8 What percentage of your property is affected by the weeds listed above? _____ %

6.9 Approximately, what do you spend on weed control per year?$ _____

6.10 a) Do you access the Regional Biosecurity Group (formerly ZCA) rebate? ☐ Yes ☐ No

b) If no, why not?

☐ Wasn't aware the rebate was available

☐ Difficulty of filling out the necessary paperwork

☐ Difficulty of accessing the necessary paperwork

☐ Other

6.11 Approximately, what do you spend on feral animal control per year? $ _____

7 Extension of Information

7.1 Do you use any of the following to source information regarding the pastoral industry?

☐ Publications ☐ Radio ☐ Field days

☐ Other producers ☐ Producer groups ☐ Internet

☐ DAFWA Extension officers ☐ Training courses

☐ Other_____

7.2 What publications do you read for information regarding the pastoral industry?

☐ Qld Country Life ☐ NQ Register ☐ The Land

☐ DAFWA publications ☐ Pastoral Memo ☐ Stock Journal

☐ Farm Journal ☐ Farm Weekly ☐ Countryman

☐ MLA publications

☐ Other_____

7.3 Please rate the effectiveness of the following DAFWA extension methods:

(1-5 where 1 = not very effective, 3 = neutral, 5 = very effective)

☐ Field Days ☐ Training workshops ☐ One-on-one/Station visits ☐ Agnotes

☐ Other_____

7.4 In what areas of your business would you like further information or training?

☐ Business Management ☐ Animal Health and Nutrition ☐ Grazing Land Management

☐ Breeder Herd Management ☐ Pasture Monitoring

☐ Other_____

7.5 Do you have dealings with advisory committees? ☐ Yes ☐ No

7.6 a) Are you happy with the representation your advisory committee provides? ☐ Yes ☐ No

b) If not, how could it be improved? _____

7.7 In the last twelve months, have you sourced or received information or support from DAFWA that has assisted your decision making? ☐ Yes ☐ No

7.8 Has FarmReady assisted you to attend a training course you otherwise would not have attended? ☐ Yes ☐ No

7.9 a) Which of the following courses have you attended in the last 3 years, and

b) Have you changed/made any management decisions as a result of any of these courses?

Attended	Made changes	
☐ Grazing Land Management	☐ Yes	☐ No
☐ Grazing for Profit	☐ Yes	☐ No
☐ Rangeland Management	☐ Yes	☐ No
☐ Nutrition Edge	☐ Yes	☐ No
☐ Breeding Edge	☐ Yes	☐ No
☐ Business Management	☐ Yes	☐ No
☐ StockTake	☐ Yes	☐ No
☐ Other	☐ Yes	☐ No

7.10 Have you adopted any of these strategies since 2004/05?

	Yes	No
Managing young heifers separate from breeders	☐	☐
Preventing out of season pregnancies (bull control)	☐	☐
Improving joining weights through supplementation	☐	☐
Improving joining weights through use of better paddocks	☐	☐
Vaccination against disease	☐	☐
Time of year that weaning occurs	☐	☐
Early weaning of calves from heifers	☐	☐
Mating heifers for the first time as “yearlings”	☐	☐
Use of pregnancy testing	☐	☐
Bull fertility testing	☐	☐
Bull percentage used at mating	☐	☐
Age of bulls used	☐	☐
Genetics/selection for fertility	☐	☐

Other _____

7.11 Indicate how much you agree with the following statements describing your attitude towards changing the way you manage your pastoral business in the future?

(1-5 where 1 = strongly disagree, 5 = strongly agree)

Won’t change – don’t think we could do it any better 1 2 3 4 5

Won’t change – haven’t got the resources to change (e.g. finance, paddocks, labour)

1 2 3 4 5

We can't change much, as other practises are not practical in our situation 1 2 3 4 5

Would consider changing if more information was available for alternative management practises (e.g. costs and benefits quantified) 1 2 3 4 5

Would change if new techniques are demonstrated to be better 1 2 3 4 5

Are definitely thinking of changing what we do 1 2 3 4 5

7.12 if you required further information or contact with DAFWA, what are your preferred methods of contact?

☐ Phone ☐ Email ☐ Fax ☐ In person

☐ Other_____

7.13 How do you think DAFWA could improve its service to your business and/or the pastoral industry?

_____

7.14 What do you think are the main issues affecting the profitability of your enterprise?

☐ Cost of inputs ☐ Lack of alternative markets ☐ Cost of labour

☐ Cost of infrastructure ☐ Poor reproductive rates ☐ Shortage of labour

☐ Other _____

7.15 What do you feel are the main issues affecting the environmental sustainability of your enterprise?

☐ Exotic weeds ☐ Feral animals ☐ Erosion

☐ Woody thickening (Tourists etal) ☐ Climate variability ☐ Unregulated access

☐ Wildfire ☐ Patch grazing

☐ Other _____

7.16 Why do you choose to be a member of the Pastoral Industry?

_____

6.2 Appendix 2 – Sales and Market Information

Number of Kimberley respondents who sold into different markets in 2009

Animal Type	n	Total numbers	Minimum numbers	Maximum numbers	Average numbers	Average weight	Average age
Feeder steers – live export	23	54,569	100	7,377	2,373	300	2
Slaughter steers – live export	16	19,735	2	6,000	1,233	427	3
Feeder steers – WA	9	10,229	80	2,000	1,137	239	1
Slaughter steers - WA	0	0	0	0	0	0	0
Mickies – live export	18	22,936	10	10,000	1,274	297	2
Mickies – WA	10	15,495	90	5,900	1,550	226	2
Mickies - slaughter	0	0	0	0	0	0	0
Bulls – live export	23	4,454	5	1,200	194	471	6
Bulls - WA	7	3,901	50	1,600	557	464	5
Bulls - slaughter	2	210	60	150	105	469	8
Heifers – live export	21	20,856	101	2,400	993	279	2
Heifers – WA	10	28,431	481	17,000	2,843	228	1
Heifers - slaughter	1	92	92	92	92	380	3
Cows – live export	19	17,545	29	2,500	923	406	9
Cows – WA	9	20,387	301	5,000	2,265	383	7
Cows - slaughter	3	2,618	120	2,118	873	403	9

Number of Pilbara respondents who sold into different markets in 2009

Animal Type	n	Total numbers	Minimum numbers	Maximum numbers	Average numbers	Average weight	Average age
Feeder steers – live export	9	5,293	53	1,500	588	312	2
Slaughter steers – live export	10	9,192	30	2,700	919	413	3
Feeder steers – WA	9	1,967	30	565	219	317	3
Slaughter steers - WA	5	567	13	300	113	534	4
Mickies – live export	17	11,410	13	2,500	671	271	2
Mickies – WA	4	573	92	217	143	178	1
Mickies - slaughter	2	400	100	300	200	375	2
Bulls – live export	9	3,210	14	1,500	357	473	5
Bulls - WA	2	182	32	150	91	460	3
Bulls - slaughter	9	555	10	300	62	564	7
Heifers – live export	13	6,340	3	2,000	488	323	2
Heifers – WA	9	4,131	56	1,725	459	246	1
Heifers - slaughter	1	420	420	420	420	350	2
Cows – live export	10	3,640	3	1,000	364	426	8
Cows – WA	12	6,046	65	1,679	504	391	8
Cows - slaughter	10	1,218	44	217	122	453	8
Other	2	719	219	500	360	215	3

Number of Kimberley respondents who sold into different markets in 2010

Animal Type	n	Total numbers	Minimum numbers	Maximum numbers	Average numbers	Average weight	Average age
Feeder steers – live export	22	25,064	36	4,000	1,139	297	2
Slaughter steers – live export	10	10,934	19	6,000	1,093	389	3
Feeder steers – WA	12	12,379	110	2,926	1,032	264	2
Slaughter steers - WA	7	495	2	378	71	479	5
Mickies – live export	10	10,792	10	6,000	1,079	266	2
Mickies – WA	7	14,385	20	5,200	2,055	244	2
Mickies - slaughter	2	530	250	280	265	415	3
Bulls – live export	15	1,951	2	1,000	130	484	6
Bulls - WA	5	2,177	2	1,800	435	486	5
Bulls - slaughter	9	1,707	10	600	190	533	7
Heifers – live export	17	18,217	50	3,000	1,072	286	2
Heifers – WA	9	9,814	72	2,000	1,090	252	2
Heifers - slaughter	0	0	0	0	0	0	0
Cows – live export	15	20,515	37	16,000	1,368	403	9
Cows – WA	9	12,519	143	4,000	1,391	402	8
Cows - slaughter	10	3,619	23	1,600	362	419	8
Other	0	0	0	0	0	0	0

Number of Pilbara respondents who sold into different markets in 2010

Animal Type	n	Total numbers	Minimum numbers	Maximum numbers	Average numbers	Average weight	Average age
Feeder steers – live export	5	3,101	100	2,000	620	302	2
Slaughter steers – live export	1	1,000	1,000	1,000	1,000	390	2
Feeder steers – WA	5	3,743	171	1,098	749	234	2
Slaughter steers - WA	1	7	7	7	7	500	4
Mickies – live export	6	2,297	97	800	383	262	2
Mickies – WA	3	2,001	500	756	667	143	1
Mickies - slaughter	0	0	0	0	0	0	0
Bulls – live export	0	0	0	0	0	0	0
Bulls - WA	3	293	43	200	98	333	3
Bulls - slaughter	2	117	17	100	59	450	5
Heifers – live export	1	2,000	2,000	2,000	2,000	290	2
Heifers – WA	7	5,522	300	1,700	789	174	1
Heifers - slaughter	0	0	0	0	0	0	0
Cows – live export	0	0	0	0	0	0	0
Cows – WA	7	5,942	100	2,897	849	340	9
Cows - slaughter	3	649	102	400	216	413	8
Other	4	6,252	700	2,891	1,563	181	3

6.3 Appendix 3 – Extension of Information

Percentage of surveyed producers who read various rural publications (most producers read from more than one source)

	East Kimberley	North Kimberley	West Kimberley	East Pilbara	West Pilbara	Total
n	18	5	26	11	17	77
QLD Country Life	72%	40%	69%	36%	35%	56%
NQ Register	33%	20%	12%	0%	12%	16%
The Land	17%	0%	19%	0%	18%	14%
DAFWA Publications	50%	20%	31%	45%	65%	44%
Pastoral Memo	89%	40%	88%	82%	94%	86%
Stock Journal	17%	0%	4%	0%	0%	5%
Farm Journal	11%	0%	19%	18%	6%	13%
Farm Weekly	17%	40%	58%	82%	94%	58%
Countryman	22%	40%	19%	36%	59%	32%
MLA Publications	56%	40%	73%	55%	76%	65%
Other	11%	0%	0%	9%	0%	4%

Percentage of producers surveyed who would like more information or training in various areas relating to their businesses (producers' were often interested in more than one area)

	n	Business Management	Animal Health & Nutrition	Grazing Land Management	Breeder Herd Management	Pasture Monitoring	Other
East Kimberley	18	44%	56%	72%	39%	56%	6%
North Kimberley	5	20%	60%	40%	60%	20%	0%
West Kimberley	26	46%	65%	54%	50%	42%	19%
East Pilbara	11	18%	73%	18%	55%	36%	9%
West Pilbara	17	47%	59%	24%	65%	29%	0%
Total	77	40%	62%	45%	52%	40%	9%

7. References

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