

# final report

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## Breeding EDGE Material Finalization

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## Executive summary

The Breeding EDGE material finalization project was developed to update the technical content of the workshop, re-organise the reproduction and genetics workshop notes into appropriate modules on separate days, develop a new 10 module manual and develop participant workbook of activities to develop a Breeding Herd management plan and breeding objectives.

The previous three day Breeding EDGE was primarily run as a genetic improvement and bull selection workshop. While there was a module on female reproduction, this required updating and improving. The module on breeder herd management was very limited with regard to management systems applicable to northern Australia.

The workshop has now been organised so it can be delivered as 2 days plus one day, 3 separate days or a 3-day Breeding EDGE workshop, allowing greater flexibility especially for those who can't be away from their property for more than 2 days, or are time poor. Potentially with ongoing learning groups, e.g. PDS or Profitable Grazing Systems, the days could be split further into modules as long as these modules can be delivered in quick succession, so not to lose context. This will allow the material to reach a wider audience.

Incorporation of additional research outcomes from Cashcow, Beef CRC, Beef Information Nucleus and other relevant recent research projects, was necessary to improve the extension power of the workshop and enable producers to benefit from up to date research outcomes. Text which was no longer technically sound was removed from the manual and slides.

The previous Breeding EDGE package was split firstly in two, a reproduction component and a genetic improvement component. Reproduction based modules 1 (largely), 2, 3 and 6 were split off from the genetic improvement modules 4 and 5 as per the previous Edge and re-organised in new modules 1,2,3,4, 5 and 6. The two previous genetic improvement, modules 4 and 5 and some activities in module 1 were split off and reorganized into modules 7,8, 9 and 10, with new material.

A pilot workshop was run with producers from a Belyando/Clermont producer group and others. Feedback from this workshop was used to further develop the new BE workshop.

The new breeding EDGE is different to the old breeding EDGE in that there is a greater focus on reproduction improvement of the breeder herd, including more detailed information on management systems, options and recommendations for breeding females and bulls. Female reproduction management is the focus of day 1. Bulls, reproductive diseases and the breeder herd management plan are the focus of day 2, while genetic improvement is the focus of day 3. Local vets are employed to deliver modules 4 (Bull reproduction and management) and module 5 (reproductive diseases and diseases affecting reproduction). While this increases the cost of running the workshop, there is an advantage of having local knowledge and personal contact.

Activities designed to assist participants with improving components of their current management, culminate in development of a full breeding herd management plan (module 6 at end of day 2) and breeding objectives for a genetic improvement plan (throughout day 3).

It is recommended that deliverers deliver the full workshop in its entirety to particular producer groups, even if split into individual days or modules over time. The gap between deliver of days or modules need to be fairly short for momentum and continuity of thought to facilitate practice change. The workshop should not be delivered in part as part of another workshop. A minimum of two presenters should deliver at each workshop. MLA support is required with advertising. This includes both email support with sending out event flyers and advertising the workshop in Feedback magazine. Coordination with other workshops is advised.

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# 1 Background

The Breeding EDGE material finalization project was developed to deliver on two of the recommendations from E.IFL.1302 Review and Update of FutureBeef Extension training packages. These were:

- Organisation of the reproduction and genetics workshop notes into appropriate modules accompanied with slides.
- Participant workbook of activities to develop a Breeding Herd management plan and a genetic improvement key components.

The previous three day Breeding EDGE was primarily run as a genetic improvement and bull selection workshop. While there was a module on female reproduction, this required updating and improving. The module on breeder herd management was very limited with to management systems applicable to northern Australia. Some of the manual content was no longer technically sound.

The review highlighted a business approach to breeding was necessary to assist producers with a key focus on their herds reproductive performance as well as genetic improvement.

**This project aimed to:**

## 1.1 Re-organize the material

Develop workshop modules and associated workbook activities, designed to assist producers in developing and implementing economically sound management strategies, as part of an overall management plan, to improve breeding herd productivity and profitability and better undertake genetic improvement. More specifically:

- Reorganise the existing material in specific modules and produce a workshop with 2 days largely reproduction and one day genetic improvement.
- Develop and align workbook activities with workshop modules.
- Organise the workshop so it can be delivered as 2 days plus one day, 3 separate days or a three day Breeding EDGE workshop, allowing greater flexibility especially for those who can't be away from their property for more than 2 days, or are time poor.

Potentially with ongoing learning groups (e.g. PDS or PGS) the days could be split further into modules as long as these modules can be delivered in quick succession, so not to lose context. This will allow the material to reach a wider audience and be incorporated into feeder events for EDGE Network and PGS (Profitable Grazing Systems).

## 1.2 Incorporate relevant recent research outcomes

Incorporation of additional research outcomes from Cashcow, Beef CRC, Beef Information Nucleus and other relevant recent research projects, was necessary to improve the extension power of the workshop and enable producers to benefit from up to date research outcomes.

The existing manual also required some text removal where detail was no longer applicable, out of date or not technically correct.

### **1.3 Use a pilot workshop to improve the format**

Incorporate feedback from a Breeding EDGE producer pilot workshop, particularly on the new activities incorporated and format.

### **1.4 Link more closely with other EDGE workshops**

Attend a material finalisation meeting in Brisbane to ensure EDGE Network packages are linked more closely together within a business context, have consistent language terminology and key messages.

## **2 Project objectives**

### **2.1 Submit Breeding EDGE (revised)**

#### **2.1.1 Submit to MLA for final proof reading and graphic design work the following:**

- Breeding EDGE – reproduction workshop modules with slides (total delivery time being two days)
- Breeding EDGE – genetic improvements workshop modules with slides (total delivery time being one day)
- Herd Breeding management plan and genetics program plan workbook
- List of resources and materials required for the workshop
- Timing of and preparation requirements
- Detailed start and finish time of each module

#### **2.1.2 Incorporate feedback from pilot workshop into the Breeding EDGE material, prior to submission to MLA.**

#### **2.1.3 Support the MLA appointed editor, proof reader and graphic designer to ensure the workshop modules, slides and Herd Breeding management plan, genetics program template and module support notes are to MLA's satisfaction.**

## **3 Methodology**

The previous Breeding EDGE package was split firstly in two, a reproduction component and a genetic improvement component.

Reproduction based modules 1 (largely), 2, 3 and 6 were split off from the genetic improvement modules 4 and 5 as per the previous Edge and re-organised in new modules 1,2,3,4, 5 and 6.

The two previous genetic improvement, modules 4 and 5 and some activities in module 1 were split off and reorganized into modules 7,8, 9 and 10, with some new material added.

A pilot workshop was run with producers from a Belyando/Clermont producer group and others.

### 3.1 Reproduction modules

Initial detailed recommendations for changes to the reproduction based modules are shown in appendix 9.1. The current column refers to what currently was in the workshop and the recommendations formed the basis of the new reproduction component. The document content was discussed at meeting in Rockhampton in August 2016 with Jane Wightman and Geoff Neithe.

For modules 2, 3 and 4 there was little change in subheadings, with most of the changes being the content. In summary the key changes were finally applied are outlined as follows:

#### 3.1.1 Module 1. Reproduction and current herd performance:

- Renamed from “Current operation” to the above
- The case study was removed, however an activity “my operation today” included
- Profitability data from the *Northern Beef Report* was added
- Data from Cashcow was added (sub topic: Performance of northern breeding herds)
- Some new performance measures were added
- Determining the profitability of improved reproductive performance sub topic was added, and incorporated information on Breedcow Dynama
- Module includes 3 activities, last of which can become homework (performance targets)

#### 3.1.2 Module 2. Female reproduction (previously module 3):

- Text changes and updated information and research outcomes added throughout the module with some additions of important physiology e.g. folliculogenesis
  - A new section was added “Key factors affecting female reproductive performance”
- Research outcomes added from Cashcow and Breeder Mortality projects (B.NBP.0064)
- Activity added “Reproductive loss in your herd”
  - Annual reproduction cycle moved to module 3

#### 3.1.3 Module 3. Managing the breeders (previously module 6)

Relocated to module 4 i.e. designed to follow on immediately from module 3 Female reproduction

- Text changes, updated information, diagram additions and research outcomes added throughout the module
- Sub headings largely unchanged except under “Mating systems and management”
- “Mating systems and management” has been expanded from 1 page to 9 pages
- Weaning section expanded slightly
- Section “Managing replacement breeders and heifers” has word breeders removed, has been moved “pregnancy diagnosis” and has been expanded to 6 pages with 9 sub topics
- Section “Investigating poor reproductive performance” has been expanded
- Module includes 5 activities (previously 2), which become part of the plan for managing the breeder herd which is addressed in module 6
- Identification and herd recording moved to appendices as already a large module
- Evaluating options text moved to module 1 and modified there

### **3.1.4 Module 4. Bull fertility and Management (previously Module 2 Male reproduction)**

Sub headings largely unchanged except under “Bull management”

- Sub section BULLCHECK added under “Key Components of bull fertility” section
- “Bull management” section includes modified sub sections previously in module 6
- Least modified of all modules, although some text, photo and diagram changes
- Activity added (Activity 10 – Bull fertility and management), for plan (module 6)
- Yard BULLCHECK demonstration unchanged and part of this module

### **3.1.5 Module 5. Reproductive diseases and diseases impacting reproduction**

- A new module with text transferred from previous appendix and expanded
- New sub sections included on specific diseases.

### **3.1.6 Module 6. Breeder herd management plan**

- A new module designed for participants to work on their management plan incorporating previous activities
- “Putting plan into action” text transferred from previous module 6 and expanded
- Additions of templates and tools (also supplied electronically and in workbook)

Table 1. shows a comparison of topics in the version and as in the new version.



Table 1. Reproduction modules (day 1 and 2) sub topics as in previous 2016 workshop and for new Breeding EDGE with new module numbers in some cases

<b>Modules</b>	<b>Module sub topics (previous 2016 BE)</b>	<b>Module</b>	<b>Module sub topics (new 2017 Breeding EDGE)</b>
Module 1 – Current operation	Module overview My operation Case study breeding program Factors influencing animal production traits Steps in developing a breeding program Reproduction Measuring reproductive performance	<b>Module 1 – Reproduction and current herd performance</b>	Module overview Reproduction Reproduction and profitability of the beef herd The importance of a breeding herd management plan Measuring reproductive performance Performance of northern breeding herds Performance benchmarks Cashcow productivity benchmarks Determining the profitability of improved reproductive performance
<b>Module 2 – Male reproduction</b>	Module overview The importance of the bull herd Bull cost per calf weaned  Key components of bull fertility Physical (structural) soundness Reproductive soundness Libido and serving ability  Other factors affecting bull fertility Sexual maturity Disease Stress Nutrition Bull wastage	<b>Now Module 4 – Bull fertility</b>	Module Overview The importance of the bull herd Bull cost per calf weaned  Key components of bull fertility BULLCHECK (professional reproductive examination) Physical (structural) soundness Reproductive soundness Libido and serving ability Sexual maturity Other factors affecting bull fertility Disease Stress Nutrition Bull wastage Bull Management Pre-mating checks and annual re-examination

			<ul style="list-style-type: none"> <li>Bull-to-cow joining ratios</li> <li>Nutrition and body condition score</li> <li>Dominance effects</li> <li>Age of bulls</li> </ul>
<b>Modules</b>	<b>Previous module sub topics</b>	<b>Module</b>	<b>New module sub topics</b>
<b>Module 3 – Female reproduction</b>	<ul style="list-style-type: none"> <li>Module overview</li> <li>The importance of female reproduction</li> <li>Key components of female fertility</li> <li>Structural soundness</li> <li>Reproductive structures</li> <li>Stages of the reproductive cycle in the cow</li> <li>Hormones</li> <li>Sexual maturity</li> <li>Oestrus and ovulation</li> <li>Pregnancy</li> <li>Foetal growth</li> <li>Calving</li> <li>Lactation</li> <li>Calf growth and survival through to weaning</li> <li>Other factors affecting female fertility</li> <li>Disease</li> <li>Nutrition</li> <li>Annual reproduction cycle</li> </ul>	<b>Now Module 2 – Female reproduction</b>	<ul style="list-style-type: none"> <li>Module overview</li> <li>The importance of female reproduction</li> <li>Key components of female fertility</li> <li>Structural soundness</li> <li>Reproductive structures</li> <li>Stages of the reproductive cycle in the cow</li> <li>Hormones</li> <li>Sexual maturity</li> <li>Oestrus and ovulation</li> <li>Pregnancy</li> <li>Foetal growth</li> <li>Calving</li> <li>Lactation</li> <li>Calf growth and survival through to weaning</li> <li>Key factors affecting female reproductive performance <ul style="list-style-type: none"> <li>Post-partum Anoestrus (PPA)</li> <li>Losses between pregnancy diagnosis and weaning</li> <li>Losses of the breeding cow or heifer</li> </ul> </li> </ul>
<b>Module 6 – Managing the breeding herd</b>	<ul style="list-style-type: none"> <li>Module overview</li> <li>Recognising the resources</li> <li>Managing the breeding herd</li> </ul>	<b>Now Module 3 - Managing the Breeders</b>	<ul style="list-style-type: none"> <li>Module overview</li> <li>Recognising the resources</li> <li>Annual reproduction cycle</li> </ul>

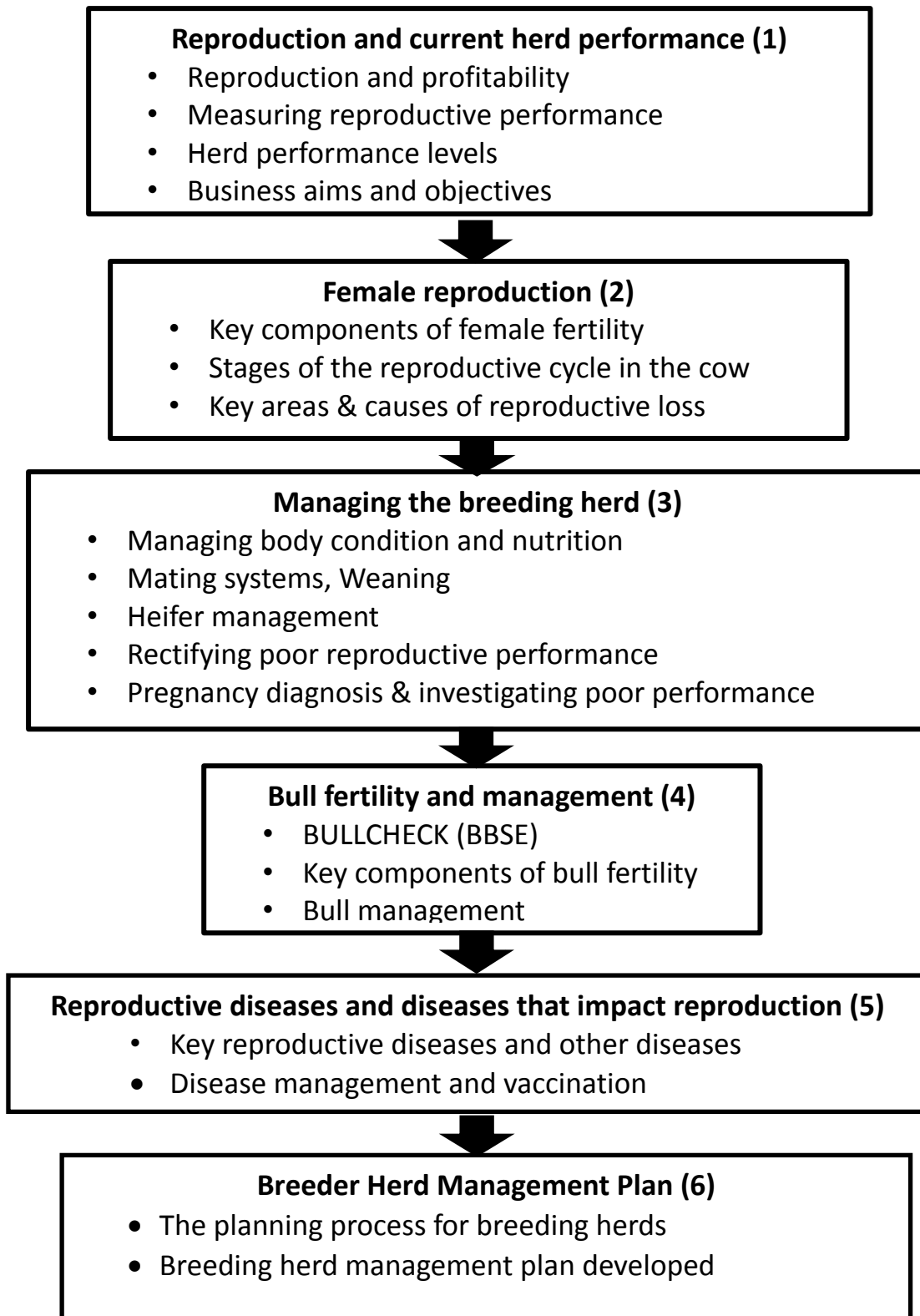
	<p>Nutrition and body condition</p> <p>Body condition</p> <p>Nutritional management</p> <p>Identify the nutrient requirements of the animal .</p> <p>Assess the quality and intake of pasture available</p> <p>Identify possible deficiencies</p>		<p>Managing the breeding herd</p> <p>Nutrition and body condition</p> <p>Body condition assessment</p> <p>Nutritional management</p> <p>Identify the nutrient requirements of the animal</p> <p>Assess the quality and intake of pasture available</p> <p>Identify possible deficiencies</p>
<b>Modules</b>	<b>Previous module sub topics</b>	<b>Module</b>	<b>New module sub topics</b>
<b>Module 6 – Managing the breeding herd</b>	<p>Mating systems and management</p> <p>    Mating systems</p> <p>Weaning</p> <p>Weaner management</p> <p>Early weaning</p> <p>Pregnancy diagnosis</p> <p>Investigating poor reproductive performance</p> <p>Managing replacement breeders and heifers</p> <p>Definitions</p> <p>Steps to success</p> <p>Genetic improvement</p> <p>Other considerations</p> <p>Maximising the value of surplus females</p> <p>The economics of fertility</p> <p>Breeder cow mortality rates</p> <p>Options to reduce breeder mortality rates</p>	<b>Now Module 3 - Managing the Breeders</b>	<p>Mating systems and management</p> <p>    Controlled mating</p> <p>    Segregated breeder management</p> <p>    Continuous mating</p> <p>Weaning</p> <p>    Early weaning</p> <p>    Management of the early weaner</p> <p>Managing replacement heifers</p> <p>Heifer segregation</p> <p>Manage heifers as they grow well</p> <p>Controlled mating</p> <p>    Steps to success</p> <p>Weaning heifers calves</p> <p>Genetic improvement and selection of heifers</p> <p>Selection and culling of heifers</p> <p>Other considerations</p> <p>Pregnancy diagnosis</p>

	<p>Managing the bulls</p> <ul style="list-style-type: none"> <li>Disease management</li> <li>Pre-mating checks and annual re-examination</li> <li>Bull to cow joining ratios</li> <li>Nutrition and body condition score</li> <li>Dominance effects</li> <li>Age of bulls</li> </ul> <p>Identification and herd recording</p> <p>Evaluating options and production systems</p> <p>Putting the plan into action</p>		<p>Investigating poor reproductive performance</p> <p>Maximising the value of surplus females</p> <p>Breeder cow mortality rates</p> <p>Options to reduce breeder mortality rates</p>
<b>Module 7 – Animal Behaviour, health and welfare</b>	<p>Module overview</p> <p>Herd health</p> <p>Temperament</p> <p>Spaying</p> <p>Drought</p>		<i>Incorporated into other modules where fit</i>
<b>Modules</b>	<b>Previous module sub topics</b>	<b>Module</b>	<b>New module sub topics</b>
<b>Appendix</b>	<p>Appendix 1 – Reproductive diseases</p> <ul style="list-style-type: none"> <li>Vibriosis (campylobacteriosis)</li> <li>Trichomoniasis</li> <li>Leptospirosis</li> <li>Tick fever (babesiosis and anaplasmosis)</li> <li>Bovine three-day sickness (three-day sickness)</li> <li>Bovine pestivirus</li> <li>Neosporosis</li> <li>IBR (infectious bovine rhinotracheitis)</li> </ul>	<b>Module 5 – Reproductive Diseases and Diseases Affecting Reproduction</b>	<p>Module overview</p> <p>Diseases that affect cattle reproduction</p> <ul style="list-style-type: none"> <li>Vibriosis (campylobacteriosis)</li> <li>Trichomoniasis</li> <li>Bovine pestivirus</li> <li>Leptospirosis</li> <li>Tick fever (babesiosis and anaplasmosis)</li> <li>Bovine three-day sickness (three-day sickness)</li> <li>Neosporosis</li> <li>IBR (infectious bovine rhinotracheitis)</li> <li>Akabane virus</li> </ul> <p>Disease management</p> <ul style="list-style-type: none"> <li>Disease management for bulls</li> <li>Disease management for females</li> </ul>

	Akabane virus Appendix 2 – Suggested vaccination program for diseases affecting reproduction		Suggested vaccination program for diseases affecting reproduction
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The above is summarised in the following workshop roadmap for Reproduction Modules 1-6 on days 1 and 2.

### 3.2 Workshop Roadmap – Reproduction Modules 1-6



### 3.3 Genetic Improvement modules

The original module 4 (Genetic principles, tools and breeding systems), was a very large module and the content of this module was split into modules 7, 8, 9 and 10 as shown in the following workshop sub topics table.

Table 2. Genetic improvement modules – old module subtopics (2016 BE) and content shift to new module sub topics (new 2017 breeding EDGE)

Modules	Module sub topics (previous 2016 BE)	Module	Module sub topics (new 2017 Breeding EDGE)
<b>Module 4 – Genetic principles, tools and breeding systems</b>	Module 4 – Genetic principles, tools and breeding systems Module overview The value of genetics  Permanent  Cumulative	<b>Module 7 – Genetic improvement of your herd</b>	<b>Module 7 – Genetic improvement of your herd</b> Module overview Factors influencing animal production traits <i>Group activity – Identifying factors that influence traits of economic importance</i> The value of genetics Proof of profit (case study examples) Historical producer demonstration site examples of genetic improvement , BIN project Steps in developing a genetic improvement program <i>Activity 13 – Traits of economic importance (Step 1)</i> <i>Activity 14 – Traits of economic importance and production targets (Steps 2 and 3 – homework)</i> Developing breeding objectives genetic improvement plan
	Basic genetic principles Genes  What are genes? What are chromosomes? How are genes transmitted from generation to generation? Gene expression  How many genes are involved? ..... What happens in the next generation? Rate of genetic improvement Genetic correlation	<b>Module 8 – Genetic principles and genetic selection tools</b>	<b>Module 8 – Genetic principles and genetic selection tools</b> Module overview <b>Basic genetic principles</b> Genes What are genes? What are chromosomes? How are genes transmitted from generation to generation? Gene expression How many genes are involved? What happens in the next generation? Variation Heritability





### 3.4 Workshop Roadmap – Genetic Modules 7-10



#### **Genetic Improvement of Your Herd (7)**

- Value of genetics and case study examples
- Traits of economic importance for your herd
- Breeding objectives for genetic improvement



#### **Genetic Principles and Genetic Selection Tools (8)**

- Basic genetic principles (what influences traits)
- How to influence the rate of genetic improvement
- Methods and tools for genetic improvement



#### **Selection and Selection Criteria (9)**

- Selection of desired traits for fertility, growth, carcass, adaptive, and temperament improvement
- Prioritising selection criteria for breeding objectives
- Identifying animals to meet breeding objectives



#### **Breeds and Breeding Systems (10)**

- Breeding systems
- Selecting the breed(s)

## 4 Results

### 4.1 Re-organization of material and modules

The new breeding EDGE is different to the old breeding EDGE in that there is a greater focus on reproduction improvement of the breeder herd.

The new Breeding EDGE **includes**:

- Relevant research outcomes, including Cash Cow outcomes, and herd performance levels achievable for different regions.
- The theory of female and male reproduction, and the 5 key drivers of reproductive performance in N. Aust.
- More detailed information on management systems, options and recommendations for breeding females and bulls.
- Activities designed to assist participants with improving components of their current management, culminating in development of a full breeding herd management plan and breeding objectives for a genetic improvement plan.
- Updated case studies and research showing genetic improvement outcomes e.g. BIN project.

The main *genetic improvement* modules covered two modules in the old Breeding EDGE, are now covered by four smaller modules.

The new breeding EDGE allows for flexibility in delivery and can be run as:

- Three consecutive days
- Three separate days or
- Two days consecutively and one day later

For producers are not able to leave their properties for 3 days this makes attending the workshop a greater possibility. Additionally, 3 consecutive days can be overwhelming for producers as there is a lot of information to absorb.

#### 4.1.1 Pilot workshop

A pilot workshop was held at Clermont in March 2017 (first 2 days) and April (3<sup>rd</sup> day) 2017. Most of the producers attending came from Clermont and the Belyando area of central Queensland. Some members of the group were part of a MLA PDS group focusing on measuring her performance using Cashcow measures. One of the producers had been part of the Cashcow research project. Another producer was specifically asked to attend the workshop as they had recently attended a Breeding EDGE workshop (previous version).

The pilot workshop was held prior to complete finalization of the manual i.e. it was in an advanced draft format but not finalized. The workbook however was complete, although did undergo editing changes post the pilot workshop.



Producers attending the pilot understood that they were to give feedback on the workshop, and they took this task quite seriously. The methodology for seeking feedback was through:

- the normal EDGE workshop feedback form
- verbal discussion during the workshop and after the workshop
- written changes and suggestions on individual sticky notes specific to each module.

The sticky notes were colour coordinated for different modules and displayed for the group to see as the module was completed.

Additional advice was sort post workshop on a number of occasions from the producer whom had attended the old version of a Breeding EDGE as well as the new version, albeit a pilot.

The following table highlights some of the key changes suggested and made as a result of the pilot.

Module	Issue	Context	Action needed	Action Taken
1	Importance of pasture (Feedback from 1 person only)	Bigger focus on pasture base needed	Slide to encompass key points	Slide to encompass key points plus additional dialogue  This is covered more in modules 2 and 4
1	Repro timeline (done on whiteboard as pilot)	Feedback – have wall size example poster.  How many examples though?	Options: Nov joining, later joining (Dec), end of February, end of January.  JW – need at least one.	Timeline now drawn on large size core flute and left up as a permanent large poster.

			Do on real estate board ... draw timeline first.	One example most relevant to group.
1	Activity 2 – calculating repro rates	Some good scores, also 2 very low scores.  Modification or rise to the challenge?  More support tools needed.  Feedback- workbook before workshop i.e. to know what data to bring.  Will asking to bring more data scare producers away? Fine line....	General consensus – leave in but modify: <ul style="list-style-type: none"> <li>• Ask what their weaning %, how did you calculate it? Everyone different...weaning % or another measure?</li> <li>• GN: Is maiden heifers included in weaning rates?</li> <li>• Can you calculate correct KPI? Or go to next best?</li> <li>• Depends on your business and what you need.</li> <li>• Limitations of weaner production measure</li> <li>• Better explanation of benefits and considerations</li> </ul>	Activity 2 reduced in size to include main reproduction measures only
1	Cashcow data	How many folk have been exposed to this already? How much detail?	Contact Dave smith...	Cashcow data set – retain all slides but hide slides where necessary. Maintained core set.
1	Activity 3 – setting new targets	Difficult if no data from previous activity 2 or should still do it?	?	Now homework activity

3	Activity 5 – pasture graph	Regional example or do their own pre workshop?  Feedback – have excel spreadsheet sent before workshop.	Before they come along.. have a prepared one for them (GN)  Option of doing their own.	Group pre-primed to bring rainfall data which helps with pasture graph
3	Activity 6 – mating and weaning management	Plastic overlay needs to be done professionally  Need large scale example for board.  Liked heifer manager wheel from next exercise. Feedback – have 3 layers to include option to shorten lengthen mating time, weaning time adjustment, mating time in relation to green date)..need some take home tools	Do overlay graphs professionally.    Controlled mating wheel: needs to be professionally made.  Yung sun graphic designer.  See adjacent notes.	Overlay graphs printed professionally
3	Activity 7 – heifer management	Heifer management tool – separate one for heifers but more layers/options as per above.	Separate heifer management wheel: needs to be made professionally	
5	Vibrio vaccine	Conflicting opinions re	Doesn't cause infertility	

		temporary infertility		
5	Use of PIs as a herd vaccinator	Conflicting advice...thought this was ruled out	???	
6	Whole module	How to make it more inspiring & interesting.  Necessary module though...	Videos of herds – high performing herds and not so going so well.	Added herd management calendar discussion and removed some other slides. Property groups working on own plans and reporting back has worked well so far.
6	Productivity measures	Different opinions on productivity measures...  Overview again of all the measures and go back to timeline?	Split in into small groups ask Qs re figure 2. In leaflet – factors in pregnant rate, calf loss, etc.	See above
General	Acronyms	Before each module?  Before workshop?	Before module	
General	Lack of tools overall	This includes: spreadsheets for data recording and calculating;  CS handouts;  other		

Actions taken to improve the workshop as a result of the pilot workshop have been well received at subsequent workshops.

#### 4.1.2 Producer learning and workshop delivery

At the time of completion of this report another 4 workshops have been held since the pilot workshop, one for a corporate company (Kidman) and one for extension staff across N. Aust.

The corporate company workshop participants scored the workshop 9.4/10 overall and a Richmond workshop scored 8.8/10 overall. It was evident that the new Breeding EDGE **enables producers to:**

- Systematically review current management components and develop a new improved management plan, with a view to improved performance and productivity.
- Understand reproductive measures and which measures are most suited to their business.
- Understand the science of reproduction and the linkage of this with management.
- Understand a range of management strategies for differing logistical and environmental situations.
- To develop and implement economically sound management strategies, as part of an overall plan, to improve breeding herd productivity.
- Understand genetic improvement tools and systems as they apply to their current production system and markets.

The Breeding EDGE workshop has been designed specifically to be delivered to producers. Extension staff who attended the Rockhampton workshop were asked to represent an actual property, whether a family operation or one connected with work. Some general comments about the **Rockhampton workshop** are as follows:

- It was easier to deliver the workshop to that represented a property with real life issues.
- Deliverers found it more difficult to deliver to an audience especially where they didn't have an actual property. Where a generalised property was represented delivery was more difficult as specific issues could not be addressed. In these cases, generalised questions and non-specific questions were asked i.e. were based on a generalised and non-specific scenarios and was difficult to address these questions in a specific manner, which resulted in generalised answers being given.
- The range in attitude towards change, from resistance to fully open minded, was no different to a normal producer group.
- With 2 new deliverers delivering sections, that they hadn't previously delivering timing was an issue, with some overlap between sections.
- As the group represented a large area of northern Australia, it was difficult to go into too much detail about specific management systems e.g. control mating. This is opposed to a workshop being held in a specific location where more details on suitable management can be addressed, and less detail on management not suitable.

Overall, the breeding EDGE workshop is easier to deliver to real producers representing a property with real life issues. Where a generalised property was represented delivery was more difficult as specific issues could not be addressed.

## 5 Discussion

### 5.1 Workshop organization

The Breeding EDGE can be delivered as a 3 day event or 2 days plus 1 day or separate days. The different delivery options have both advantages and disadvantages and if possible should be structured to suit the producer participant group.

The three-day event is possibly the most cost effective option for deliverers, but in some areas producers are unable to leave their properties for three consecutive days for various reasons (pumping water, feeding weaners, etc.). In other more isolated situations the three day workshop may work best as producers have to travel some distance to attend the workshop, it may be difficult to do that more than once in a relatively short amount of time (e.g. six week period). The larger properties have additional staff to take care of jobs while they are away for several days.

The 2 day plus 1 or 3 separate days poses higher travel costs for deliverers and is not an option where there is some distance to travel. For producers who can't leave their properties for long it leads to higher attendance figures.

### 5.2 Workshop delivery

#### 5.2.1 Workshop content

The core set of slides for the workshop should be delivered in their entirety in the main. There are a few exceptions (e.g. slides in module 1). For different locations, environments and therefore different management situations the discussion and whiteboard exercises around the slides can be modified to suit the circumstances. For example, in CQ there would be a greater focus on control mating systems there is little need to look in depth at breeder segregation (depending on workshop location).

To deliver local research results extra slides can be added for specific workshops, or a handout provided. The latter would be more suitable if relevant to only one producer group. Extra slides with locally relevant research outcomes can always be hidden when not relevant.

It is recommended deliverers deliver the full workshop in its entirety. If certain modules are missed this leaves a gap in overall breeding herd management and/or genetic improvement. This is important as the modules are linked to the activities, which together complete all aspects of a management plan. The content of modules on the various days is also linked to deliver key messages and learnings in an organised and combined manner.

There are still a few technical areas where technical experts still do not agree. These are:

- The concept of critical mating weight
- Whether persistently infected animals (PIs) with pestivirus, should be used as "herd vaccinators" or not

These areas need to be revisited after further research.

#### 5.2.2 Workshop activities and workbook

The workshop activities are an important part of producer learning which will hopefully lead to practice change. The activities give participants time to apply what they have learnt to their own situation, and provides an opportunity for them to capture possible management changes and improvements



in writing. Module 6 provides an opportunity for development of a breeding herd management plan and calendar based on the activities done up until that point.

On day 3, the activities are primarily designed to guide the participant in developing breeding objectives. Breeding objectives are critical component of an overall genetic improvement plan.

### **5.2.3 Workshop structure**

The workshop runs best according to the current run sheet. Straying outside the suggested times can mean that activities later in the day can be rushed. The main cause of going over suggested time frames is deliverer double up i.e. deliverers delivering material that is another section, or re-delivering/verbalising material that has already been delivered.

## **6 Conclusions/recommendations**

### **6.1 Breeding EDGE content and delivery**

Deliverers should research potential producers in the intended area of delivery to see which format suits them best i.e. 3 day workshop, 2 days plus one or 3 separate days. In some cases, a 3 day workshop may not suit all producers and the 2<sup>nd</sup> workshop run in the area should be 2 days plus one. Demand for Breeding EDGE material should increase as MLA approved deliverers will have the flexibility to better meet producers needs by either presenting the full Breeding EDGE three day workshop or individual days.

There is opportunity in some modules for deliverers to bring in local research outcomes. If relevant to several groups in a region (e.g Kimberley and NT) then slides can added, and these can be hidden for other regions. If data is relevant to only one group only then a handout only is recommended.

It is recommended that deliverers deliver the full workshop in its entirety to particular producer groups, even if split into individual days or modules over time. The gap between deliver of days or modules need to be fairly short for momentum and continuity of thought to facilitate practice` change.

The workshop should not be delivered in part as part of another workshop. When this happens the group is unlikely to go back and complete the rest of the Breeding EDGE, therefore not completing the overall plan which is a key trigger for action plans and taking of actions.

A minimum of two presenters should deliver at each workshop. This is required due to the complexity of the content, amount of content and the large number of activities, which producers require assistance with.

### **6.2 Research to support content delivery**

The main area where deliverers find it difficult to provide definite information and answers for producers is in the area of reproductive loss. While there is some information available, this definitely needs further research in a large project across different regions.

### **6.3 Advertising**

MLA support is required with advertising. This includes both email support with sending out event flyers and advertising the workshop in Feedback magazine. Articles in Feedback magazine are a great opportunity to advertise upcoming Breeding EDGE workshops, and have reminders of the workshops

even if no dates are set. MLA events and forums, especially genetics and breeding related forums and seminars should have Breeding EDGE expression of interest forms available.

## **6.4 Feeder and other events**

The workshop material will be available to MLA approved presenters to deliver in feeder events for MLA's new adoption program PGS (Profitable Grazing Systems) as well as being run as a full Breeding EDGE workshop and will be delivered as part of the MLA National Beef Genetics Extension Strategy.

A Breeding EDGE should be organised/attempted before other workshops which contain BE like content e.g. breeder management or Bred Well fed Well days. The reason for this is that it is hard work getting enough participants for a financially viable Breeding Edge. Due to vet fees the workshop costs more to run than other EDGE workshops and therefore needs more people to register to be financially viable. If other free (i.e no cost to producer) workshops are run first the chances of getting a Breeding EDGE booked and financially viable are much lower.

## **7 Key messages**

The new Breeding EDGE workshop has already demonstrated that it helps producers to develop and implement economically sound management strategies, as part of an overall plan, to improve breeder herd productivity and make greater genetic gains.

The workshop will assist in achieving MLA 2020 objective: Engage at least 2000 producers in programs that will build knowledge and skills to improve business performance by 5% or more.

The Breeding EDGE can be delivered as a 3-day event or 2 days plus 1 day or separate days. The different delivery options have both advantages and disadvantages and if possible should be structured to suit the producer participant group.

MLA does need to support the advertising and communication of Breeding EDGE events, to help deliverers get financially viable workshops happening.

## 8 Appendix

## 8.1 Module Sub Topic (current) and Modifications Required & Suggested Sub heading

Module	Module Sub Topic (current)	Modifications Required & Suggested
Repro Edge Spiltoff	Introductory pages	Yes, minor - update title page, acknowledgements, edge list, edge package list, specialist module list, etc.)
	Contents, list of figures and tables	Last job...
	Introduction	Yes, some changes:- wording; road map diagram; importance of repro & genetics section (delete some wording) Profit section – largely OK, suggest add IRR of different breeder status classes
<b>Module 1 –</b> Current operation p9 on original	Module overview My operation <i>Activity 1 – My operation today</i> Introduction to the case study <i>Activity 2 – Introduction to the case study</i> Case study breeding program Breeding objectives Target markets and customer requirements Resource inventory Land Cattle Total value of assets managed Breeding program <i>Breeds used</i> <i>Breeding system</i> <i>Sourcing replacements</i> Annual management calendar	Remain – minor wording changes Remain, but <b>upgrade (suggest proper exercise based on pre workshop attempt at template)</b> Replace or remove Case Study – southern orientated, some genetics info  Replace or remove Case Study – southern orientated, some genetics info <b>Replace (Use BRICK format), include intro to BRICK text, etc.</b> <b>Headings below – suggest use in template of “own operation” (to fill in pre workshop) focusing mainly on current breeding herd management and performance.</b> “  <b>Suggest management overview be added instead. (FHH has similar template.)</b> <i>Original to genetics EDGE (expand for genetics Edge)</i> <i>Original to genetics EDGE</i>  <b>Replace...align with calendar format in “own operation” template and suggested module 7 (Herd Management Plan) to link in with A&amp;E curriculum. Add exercise.</b>

	<p>Herd performance</p> <ul style="list-style-type: none"> <li>Reproduction</li> <li>Liveweight gain</li> <li>Mortality</li> <li>Replacements</li> <li>Sales</li> <li>Selling costs</li> <li>Compliance to market specifications</li> <li>Current performance and performance targets</li> </ul> <p>Selection criteria</p> <p>Factors influencing animal production traits <i>Activity 3 – Identifying factors that influence traits</i></p> <p>Steps in developing a breeding program</p> <p>Reproduction</p> <p>Measuring reproductive performance</p> <ul style="list-style-type: none"> <li>What are the practicalities and limitations of each method?</li> <li>Weight of calf weaned per cow retained</li> </ul> <p><i>Activity 4 – Calculating reproduction rates (optional)</i></p>	<p><b>Remain...align with BRICK format</b></p> <p>“</p> <p>“</p> <p>“</p> <p>“?”</p> <p>Original cut to genetics EDGE replace with age, weight, breed profile of herd</p> <p>Original cut to genetics EDGE replace with Breeders and culls market specs</p> <p>Original to genetics EDGE, replace with Breeders, bulls criteria e.g. BBSE</p> <p><i>Original to genetics EDGE</i></p> <p><i>Original to genetics EDGE</i></p> <p><i>Original to genetics EDGE</i></p> <p><b>Remain, but link with changes to following. Also some text to introduction.</b></p> <p>Remain (minor changes needed including formatting)</p> <p>“</p> <p>“</p> <p>Remain, but calculate own herd performance as well</p> <p><b>Add section Cash Cow comparative data and comparison exercise</b></p> <p><b>Components of this module then transferable to A&amp;E curriculum first section.</b></p>
<p><b>Module 2 – Male reproduction</b></p>	<p>Module overview</p> <p>The importance of the bull herd</p> <p>Bull cost per calf weaned</p> <p>Key components of bull fertility</p> <ul style="list-style-type: none"> <li>Physical (structural) soundness</li> <li>Reproductive soundness</li> <li>Libido and serving ability</li> </ul>	<p><b>Remain, but should be renamed module 4 – Male Reproduction ( as <u>Female</u> <u>Repro</u> and Management should be the next modules following module 1, for delivery ease and to link with A&amp;E curriculum flow)</b></p>

	<p>Other factors affecting bull fertility</p> <p>Sexual maturity</p> <p>    Disease</p> <p>    Stress</p> <p>    Nutrition</p> <p>Bull wastage</p>	<p><b>Expand disease section slightly</b></p> <p><b>Expand nutrition section slightly</b></p> <p><b>No written exercises in this module – requires some written exercises</b></p>
<p><b>Module 3 – Female reproduction</b></p>	<p>Module overview</p> <p>The importance of female reproduction</p> <p>Key components of female fertility</p> <p>Structural soundness</p> <p>Reproductive structures</p> <p>Stages of the reproductive cycle in the cow</p> <p>Hormones</p> <p>Sexual maturity</p> <p>Oestrus and ovulation</p> <p>Pregnancy</p> <p>Foetal growth</p> <p>Calving</p> <p>Lactation</p> <p>Calf growth and survival through to weaning</p> <p>Other factors affecting female fertility</p> <p>Disease</p>	<p><b>Remain but as Module 2 – Female Reproduction, following module 1, as per A&amp;E curriculum flow.</b></p> <p><b>Add 5 key drivers of repro performance in northern Aust (re A&amp;E curriculum).</b></p> <p><b>Some pregnancy diagnosis management text (p74 &amp; 75) to management module</b></p>

	<p>Nutrition</p> <p>Annual reproduction cycle</p>	<p><b>Expand?</b></p> <p><b>Becomes an exercise in management module</b></p> <p><b>No written exercises in this module – again requires some written exercises</b></p>
<p><b>Module 6 – Managing the breeding herd</b></p>	<p>Module overview</p> <p>Recognising the resources</p> <p>Managing the breeding herd</p> <p>Nutrition and body condition</p> <p>Body condition</p> <p>Nutritional management</p> <ul style="list-style-type: none"> <li>Identify the nutrient requirements of the animal</li> <li>Assess the quality and intake of pasture available</li> <li>Identify possible deficiencies</li> </ul> <p><i>Activity 11 – Breeder energy requirements and pasture availability</i></p> <p>Mating systems and management</p> <ul style="list-style-type: none"> <li>Mating systems</li> </ul> <p>Weaning</p> <p>Weaner management</p> <p>Early weaning</p> <p>Pregnancy diagnosis</p> <p>Investigating poor reproductive performance</p>	<p><b>Spilt existing very large module 6 into 2 modules:</b></p> <p><b>Managing Breeding Females (module 3) to follow Female Repro</b></p> <p><b>Managing Bulls (module 5) to follow male repro</b></p> <p><b>(note more exercises required)</b></p> <p><b>Module 3 – Managing Breeding Females</b></p> <p><b>Suggest flow of Topics headings and flow align with those in A&amp;E curriculum:</b></p> <ul style="list-style-type: none"> <li>○ Assessing and Monitoring cow &amp; heifer body condition and nutritional status. <b>Incorporate exercises.</b></li> <li>○ Total Diet management (<i>incorporate existing sub topics p 127 of existing</i>)</li> <li>○ Weaning management strategies</li> <li>○ Mating Management strategies <ul style="list-style-type: none"> <li>▪ controlled</li> <li>▪ breeder segregation</li> <li>▪ continuous and combo options</li> </ul> </li> <li>○ Heifer management <ul style="list-style-type: none"> <li>▪ Growth impacts on fertility</li> <li>▪ Mating management</li> </ul> </li> <li>○ Selection of Replacements</li> <li>○ Investigating Poor Performance and Culling</li> <li>○ Pregnancy Diagnosis and foetal aging applications</li> <li>○ Maximising the value of females</li> </ul> <p>- <b>Include more exercises in above (CP diet shortfall, mating/calving versus nutrition, annual repro cycle etc.)</b></p>

	<p>Managing replacement breeders and heifers</p> <p>Definitions</p> <p>Steps to success</p> <p>Genetic improvement</p> <p>Other considerations</p> <p>Maximising the value of surplus females</p> <p style="padding-left: 20px;"><i>Activity 12 – Compare the cull cow prices</i></p> <p>The economics of fertility</p> <p>Breeder cow mortality rates</p> <p>Options to reduce breeder mortality rates</p> <p>Managing the bulls</p> <p style="padding-left: 20px;">Disease management</p> <p style="padding-left: 20px;">Pre-mating checks and annual re-examination</p> <p style="padding-left: 20px;">Bull to cow joining ratios</p> <p style="padding-left: 20px;">Nutrition and body condition score</p> <p style="padding-left: 20px;">Dominance effects</p> <p style="padding-left: 20px;">Age of bulls</p> <p>Identification and herd recording</p> <p>Evaluating options and production systems</p> <p>Putting the plan into action</p> <p style="padding-left: 20px;"><i>Activity 13 – Starting the breeding plan for your operation</i></p>	<p><b>See also A&amp;E “gaps” document (e.g. expand mating systems information &amp; slides, also heifer management)</b></p> <p>Include some text from p74 and 75 (original) re pregnancy diagnosis.</p> <p><b>Include some of these sub topics in heifer management section</b></p> <p><b>Rename as “example management overview”?</b></p> <p><b>Review Chudleigh report...</b></p> <p><b>Remain</b></p> <p><b>Module 5 - Managing Bulls module</b></p> <p><b>Suggest Topics headings align with those in A&amp;E curriculum:</b></p> <ul style="list-style-type: none"> <li>- Managing bulls to improve bull performance and conception %’s <ul style="list-style-type: none"> <li>o Nutrition &amp; body condition score</li> <li>o Premating &amp; annual checks</li> <li>o Joining ratios</li> <li>o Relocation management</li> </ul> </li> </ul> <p><b>remain</b></p> <p><b>remain</b></p> <p><b>Move Identification and Recording to breeding herd management module (module 3) as links in with mating systems (to go after mating systems).</b></p>
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		<p><b>Options, etc. Needs rewriting with examples.</b></p> <p><b>To go Module 7 – Herd Management Plan Development (to align with A&amp;E curriculum) and produce better learning outcomes from stand-alone Repro Edge. Requires a better template...</b></p>
<p><b>Module 7 – Animal Behaviour, health and welfare</b></p>	<p>Module overview Herd health Temperament Spaying Drought</p>	<p>Suggest welfare, health and temperament issues be addressed when discussed in management modules.</p> <p>This module, expanded, is a potential EDGE package. e.g. Husbandry, Health &amp; Welfare. (A framework for which exists in module 7 of Managing Indigenous Pastoral Lands manual <a href="#">Module 7 Managing Indigenous Pastoral Lands Manual (RIRDC)</a>). <b>The Reproductive Diseases and Herd Health modules of which could double for use in a stand-alone Repro Edge and the A&amp;E Curriculum Topic 2 (Effective Management of Reproductive Disease and Health).</b> Learning Topics listed in this A&amp;E curriculum topic are:</p> <p><b>Managing Reproductive Diseases and Herd Health</b></p> <ul style="list-style-type: none"> <li>- Reproductive Diseases</li> <li>- Diseases which cause losses and/or poor health in northern Australia</li> <li>- Using a diagnostic approach to identifying the major diseases affecting herd performance</li> <li>- Cost effective health programs</li> <li>- Strategies to manage disease and improve herd health <ul style="list-style-type: none"> <li>o Vaccination programs and protocols</li> <li>o Biosecurity management</li> <li>o Animal selection and culling</li> <li>o Monitoring &amp; treatment</li> </ul> </li> </ul>

<b>Appendices</b>	Appendix 1 – Reproductive diseases Vibriosis (campylobacteriosis) Trichomoniasis Leptospirosis Tick fever (babesiosis and anaplasmosis) Bovine three-day sickness (three-day sickness) Bovine pestivirus Neosporosis IBR (infectious bovine rhinotracheitis) Akabane virus	Suggest be shifted to above (and remove non repro diseases out of Reproductive disease section)
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