final report

Project code: B.PRS.0303 / PIRD.03.Q04

Prepared by: Merv Mayes

Western Downs Beefplan Group

Date published: June 2005

ISBN: 9781741918694

PUBLISHED BY
Meat & Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Spike Feeding Heifers

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

Contents

Introduction

As in any environment, the management and selection, and therefore performance of young breeders, is the most critical in terms of the total productivity of the breeding herd. Across the western Downs of southern inland Queensland, it is widely accepted that the mating of yearling heifers is standard practice and typically, all non-pregnant females are culled. Whilst the nutritional and climatic conditions in this region are generally much better than the coastal and northern parts of Queensland, a high level of management and selection is required to optimise the reproductive performance of breeding herds. This is particularly so in the less productive land types and in extensively managed herds. It is against this background that this project was developed.

Project Objectives

The project was aimed at determining practical, cost effective strategies to achieve increased calf output by addressing three problems:

a. low, spread out, or late conceptions in maiden heifers;
b. first calf cows that fail to complete calving; and
c. a low conception rate from first calf cows (i.e. second mating).

More specifically to determine practical cost effective strategies to:

- Increase the number of live calves produced per hundred females mated from both 2 y.o. first calvers and 3 y.o. second calvers by a minimum of 5%.
- Have a more compact mating and therefore calving period i.e. maximum of 9 weeks for maidens and 12 weeks for older females.
- Reduce the number of assisted births and/or dam and calf deaths (first calvers)
- Reduce other input costs (eg. better utilisation of bulls, more efficient supplement use)

Methodology

The planned methodology incorporated the following two broad areas of activities:

a. Compilation of a situation analysis and recommended management strategies

- Draw on relevant expertise, knowledge and literature
- Identify key issues and compile practical recommended management strategies

b. Practical demonstration of management strategies on property

- Between 3 and 4 herds from within the group participating in different parts of the study (depending on season etc)
- Moorabinda and Riverglen focussed on optimising conception rates in yearling maiden heifers and two year old first calvers;
- Goorewan focussed on investigating the potential causes of the failure of some first calvers to complete calving;
- Tarossie as a small case study which is already implementing many of the recommended practices.

Situation Analysis and recommended practices

Current Situation

There is a need to identify and cost effectively manage – disease, genetics, selection processes, nutritional and hormonal triggers, body weight, condition, weight gain, timing of operations and other issues which are impacting on the performance of young breeders.

Conception Rates

In terms of conceptions, difficulties exist on two fronts.

a. Firstly, often a below acceptable percentage of yearling mated heifers conceive in a short mating period. As a result, the mating period is often extended and or delayed resulting in late calving the following season.
b. Secondly, in many cases where two-year-old first calvers are not well managed (which is compounded by calving late), re-conception rates can be particularly low. These animals have a very high nutritional requirement due to pregnancy, and then lactation, which is compounded by the fact that they are still trying to grow themselves.

Better management of the young breeders in the herd particularly, offers significant benefits to the productivity and profitability of the whole breeding enterprise. However, while the focus in this project has not been on the bulls, they offer perhaps the largest opportunity for improving the reproductive performance of the herd. In northern Australia, it has been shown that 7% of bulls sire no calves whatsoever and 56% sire less than 10% of the calves. A mere 13% of bulls sire over 30% of the calves.

Survival of the embryo, foetus and young calf

Beyond the point of conception, the priority is to achieve live healthy calves that have a high likelihood of surviving at least until weaning. Potential losses and infection may occur at various stages throughout the pregnancy, at the point of calving (eg still born, calving difficulty etc) or in the first few days post calving. Within the region, several factors have been identified as impacting on calf viability both pre and post parturition. In some cases, the dam as well as the calf is lost.

Diseases such as *leptospirosis* have long been recognised as a significant reproductive disease on the western Downs, thus vaccination is a standard practice in most well managed herds. Losses from Lepto are typically in the last trimester, at birth, or soon after. *Vibriosis*, a venereal disease which typically causes losses very early in pregnancy, is also widely recognised and vaccination of bulls tends to be standard practice. However, questions have been raised over the efficacy of the vaccine in recent times. *Pestivirus*, though having been endemic for a long time, has only in recent years been widely recognised as a common cause of reproductive loss (and other production losses). It's prevalence is widespread across herds causing a base level of loss each year (often undiagnosed), however the most significant effects are observed when an infected animal is introduced into a naïve herd.

Calving difficulty is also a factor of varying significance in most herds calving two year old females. Some genetic lines (rather than breed) have greater difficulty. Typically the difficulty is as the definition suggests – foeto-pelvic disproportion. Birth

weight is the single most important genetic influence on calving difficulty, followed by pelvic size of the heifer. Outside malpresentation, calving difficulties do not occur beyond the first calf, unless poor management decisions over a period of time have resulted in older females also experiencing difficulty. High nutrition at inappropriate stages of pregnancy will exacerbate a potential or existing calving problem.

On the western Downs, a further source of calving difficulty is reported across herds at various times when the female appears to cease the calving process before completing the delivery of the calf. Unobserved, typically the female dies with the calf only partly delivered. Typically this is reported in the absence of an energy deficit as may be expected in a nutritionally challenging season. Regularly the heifers are in good condition and it is not uncommon that the reported cases involved heifers that were grazing buffel grass.

Recommended Practices

Selection of maiden heifers and bulls pre-mating to reduce risk of calving difficulty

Where calving difficulty is a problem, a multi-pronged approach is likely to be most effective. Pelvic measure yearling heifers pre-mating and where possible adjust figures to 12 months of age. As determined by the work of Gene Deutscher these adjusted pelvic areas are divided by 4.6 to indicate a likely safe birth weight for that female. This process can be used to cull heifers falling below a set pelvic area, to cull a chosen percentage of the smallest pelvic areas, or to cull all heifers with pelvic sizes too small to deliver a selected expected birth weight (eg 34kg).

On the bull side of the equation, with birthweight being the most important genetic influence on calving difficulty, birthweight EBVs should be used to select bulls which fall within an acceptable range relative to the average for that breed. Where available, selecting sires with more positive calving ease direct EBVs (relative to breed average) and more negative gestation length EBVs (relative to breed average), will also have beneficial effects.

Selecting bulls to improve conception rates during shorter mating periods

Bulls that have passed all aspects (scrotal size, physical, semen, morphology and serving) of a standard BBSE (Bull Breeding Soundness Evaluation) as certified by the Australian Association of Cattle Veterinarians (AACV) have a much improved probability of achieving pregnancy in a high percentage of cycling females in short mating periods.

Vaccination of breeding females and bulls

Vaccination for Leptospirosis of all animals of breeding age each year, is considered a basic requirement. Boosters are best timed to coincide with the wet season (typically the first third of pregnancy) – the time at which prevalence, and risk to the cow are greatest. This will often coincide with branding. Heifers will initially require two vaccinations. Pestivirus vaccine (Pestigard) is relatively new on the market. Individuals need to assess the cost of vaccination relative to the annual losses that are being incurred. Because vibriosis is a venereal disease, vaccination of all bulls (initially two vaccinations about one month apart the second of which at least one month prior to mating, plus annual boosters) is the standard recommendation.

Nutritional Management of maiden heifers

Traditionally, critical mating weights alone have been used as a guide for mating heifers. These vary between genotypes (eg 280kg for British breds up to 320kg for

European types), but perhaps even more markedly within genotypes due to inherent fertility.

In addition to the target weight of heifers at mating, the nutritional plane of heifers in the months leading up to mating is critical. An average daily gain of 0.3 to 0.6kg/hd/d for about 100 days prior to mating, is recommended. Cost effectiveness of supplementary options to achieve this needs to be assessed on an annual basis depending on base level weight gain on pasture and cost of supplement options. An example of how the required level of production may be economically achieved on typical western Downs pastures at that time of year (unsupplemented weight gains of 0 to 0.2kg/hd/d), would be by supplementing with approximately 500g protein meal/hd/d. Typically the response for say 200-250kg heifers would be a potential increase in dry season weight gain from 0.2 to 0.5 kg/hd/d. Even at $500/t, the total cost would be $25/head relative to a minimum of 20kg extra weight gain priced conservatively at $1.50/kg worth $30. As well as being at least cost neutral in the worst case scenario, the major benefit comes in a more condensed and higher conception rate.

Nutritional Management of first calvers

The work of Geoff Fordyce and others clearly shows the potential benefits of targeted supplementation of first calvers to cost effectively increase the conception rates during the second mating. This form of supplementation, often referred to as 'spike feeding' assumes that the first calvers are in an energy and protein deficit situation in the period leading up to calving. Supplementation at this time is focussed on initiating ovarian activity, rather than the direct nutritional status of the female. It generally involves feeding approximately 20MJ ME/hd/d and balanced protein to the females in the 6 weeks prior to calving. Feeding post calving tends to be cost ineffective. If nutritional circumstances during this pre-calving period are seasonally above average (eg due to herbage growth during a wet winter), spike feeding is not recommended. Nutrient supply from such a pasture would typically exceed that from a poor quality pasture plus six weeks of targeted supplementation. It would also often persist for a longer period with a potential increase in the risk of calving difficulty.

Timing and length of mating

Mating time should be targeted at a high probability across years, of having the majority of lactating females reaching peak lactation (2-3 months post calving) after the break in the season. That is, they normally will not have an extended period in which they must 'milk off their back' because their nutritional demand is far in excess of nutrient supply from pasture. Critical mating dates can be calculated using an analysis of 'break in the season' data using Rainman and similar software.

It is recommended to mate heifers at the same time as lactating females, or even earlier if possible, to maximise the opportunity for re-conception the following year. Maiden heifers should be mated for a shorter period than the 'wet' herd to identify the more fertile animals.

A short and early mating (therefore early calving) period is critical for identifying more fertile genetics and increasing the probability of re-conception at the second mating when they have a calf at foot.

What was done on property

Moorabinda

Females from three age groups were involved in activities for this PIRD, namely the No. 2's, No. 3's and No. 4's – a total of 880 animals. These treatments and the

responses (where known) are best explained in Figure 1. Treatments included 'supplementing' maiden heifers prior to and during the start of their first mating (No. 3's and No. 4's). In some cases this involved utilising a 'fresh' paddock, and other cases a supplement of whole cottonseed (WCS) or cottonseed meal (CSM). All heifers at Moorabinda are mated as yearlings with the exception of one bought in group during the period. All failing to produce a calf are culled.

In addition, a number of groups of first calvers (rising two year old females) were supplemented with WCS or CSM. In each of these cases the feeding was from around the start of calving (one to two weeks before) and therefore does not technically meet the description of spike feeding though later calvers will have been spiked. It could be argued that the later calvers are the less fertile ones and will need the most help to go back in calf before the end of the mating period. No control groups were possible due to difficult seasonal conditions however results could be compared to historical results. All females were vaccinated for Leptospirosis and Pestivirus.

Riverglen

Females from three age groups (No. 2's, No. 3's and No. 4's) were utilised in different treatments – a total of 236 animals. These treatments and their responses can be viewed in Figure 2. Treatments included the use of spelled paddocks, and supplementation with WCS for some maiden females and some first calvers. Mating was more staggered, variable and generally later in timing, and duration of mating was regularly unknown. Some heifers (eg the No. 2's) were held over and mated 6-12 months later than normal because, due to poor seasonal conditions, they were poorly grown at normal mating time. Some females that failed to conceive were carried over to a later time and re-mated. No control groups were possible due to difficult seasonal conditions. All females were vaccinated for Leptospirosis and Pestivirus.

Goorewan

No activity relevant to this project was undertaken at Goorewan as planned. Therefore none of the investigation regarding causes or potential prevention of first calvers that fail to complete calving, was done.

Tarossie

Tarossie, a small breeding operation was utilised as a case study as many of the principles discussed in this PIRD have been implemented for some years and the results recorded.

Each year CSM is used to supplement weaner heifers in the lead up to the first mating as yearlings. The level and duration is modified according to the preceding seasonal conditions, seasonal outlook, heifer weight and condition, and pasture supply and quality. Typically they would be fed about 500g/hd/d of CSM for the 100 days preceding mating. Mating of maiden heifers is for 6-7 weeks starting around the 20-22 of October. All heifers are Pelvic measured and those with smaller pelvises (adjusted to 12 months of age) are culled before mating. Selection for low birth weight EBVs relative to above average growth is targeted in the sires.

Each year first calvers (two year old) are spike fed for approximately 6 weeks prior to calving. The level and duration is modified according to preceding seasonal conditions, seasonal outlook, heifer weight and condition, and pasture supply and quality. Typically they would be fed about 1.5kg/hd/d of WCS (or sometimes a molasses/CSM mix). In poorer seasons older cows also receive a level of spike feeding if considered necessary. The mating period for all wet females (including first

calvers) is now, (and has been for the last 3 matings), a maximum of 9 weeks, commencing at the same time as for the maiden heifers.

All empty females are culled. All breeding animals are vaccinated for Leptospirosis and bulls vaccinated for Vibriosis and Ephemeral Fever. All bulls are serving capacity and semen tested (including morphology) prior to their first mating, and semen tested each year thereafter.

On property Results

Moorabinda
The results available at the time of report writing are included in figure 1. Pregnancy/calving records were not available for all 'treated' groups of females.

Riverglen
The results available at the time of report writing are included in figure 2. Pregnancy/calving records were not available to follow through the outcomes of all supplementary treatments.

Tarossie

Outcomes from the management strategies implemented over the last seven years are documented in the following table.

	05/06 Mating	**04/05 Mating**	**03/04 Mating**	**02/03 Mating**	**01/02 Mating**	**00/01 Mating**	**99/00 Mating**
Yearling heifers % pregnant	75	83	84.2	63.6	93.8	55	27.8
Yearling heifers Av mating wt	395	360	389	340	353	239	259
Yearling heifers Min mating wt	304	292	276	280	318	190	200
Yearling heifers Max mating wt	440	416	456	388	382	296	320
Yearling heifers kg/hd/d wean-mating	0.67	0.57	0.724	0.55	0.55	0.08	0.16
2yo first calvers % pregnant	88.9	78.6	100	100	100	20	-
Cows (rest) % pregnant	96.9	97.5	97.5	88.6	91.3	82.2	82.9

Analysis of Data and Discussion

Moorabinda

In the Moorabinda herd, the time of mating and length of mating is fairly consistent across years and age groups. All females are mated first as yearlings. The one exception was a group of bought in No. 03's which were mated as 2 y.o.'s. Generally good responses have been achieved by supplementing maiden heifers and spiking first calvers.

The results suggest conceptions in supplemented maiden heifers to be around 90% (+/- 5%), compared to what has historically been about 70-75%. For example, for the No. 03's which were first mated as yearlings, positive responses were achieved from 'supplementing' for approximately two months prior to mating and during the start of mating by either providing a fresh paddock, or supplementing with whole cottonseed (WCS). However, it would appear that the response was better for the WCS (96% vs 86%). The introduction of Pestigard vaccination in this season could also be responsible for some of the benefits, though it is unlikely because pestivirus more commonly causes late abortion (post pregnancy testing), still birth or other complications with calves born alive.

In the case of the No. 04 maiden heifers, the group which were supplemented with WCS again outperformed the group which were put into a fresh paddock prior to mating (94 vs 90%), though both groups performed very well. Interestingly, both of these groups which were first mated as yearlings outperformed the group of bought in No. 03's which were first mated as 2 y.o.'s in the same year and were also supplemented with WCS prior to mating (88% pregnancy). It is feasible that the homebred herd has benefited from both long term selection pressure for fertility and better nutritional management.

One group of No. 02 and three groups of No. 03 first calvers were supplemented with either cottonseed meal (CSM) or WCS. However in all of these cases, supplementation started with the commencement of calving or a short time before and as such does not qualify fully as 'spike' feeding, remembering that the purpose of spike feeding is to spike the ovaries prior to the commencement of lactation. This effect will not be achieved once the cow has calved. Those females which calved in the latter half of the calving may have received an effective spike. This supports one of the benefits of having a short mating period (particularly in maiden heifers). If calving is to take place over a short period, the period of supplementation is much shorter and therefore more cost effective. Supplemented first calvers have had conception rates of approximately 85-90% vs 70% historically, though precise data was not available for each of the mating groups.

In the Moorabinda herd it would appear that positive responses have been achieved by better managing the nutrition of young breeders, however there is some opportunity to improve efficiencies and cost effectiveness by better targeting the type, amount and timing of the supplementation. As the nutritional management becomes more targeted, mating periods can be reduced further without any reduction in conception rates.

Riverglen

In the Riverglen herd, the owner reported that supplementation prior to mating improved conception rates particularly for remated heifers with their first calves, and

the calves were much better. However, there are only limited results documented in this report which clearly show this. In the case of the 66% of the No. 02's that did get pregnant, supplementation with WCS commenced after the start of calving and therefore does not meet the criteria of 'spike feeding' however, some of the later calvers may have been spiked. Of the 54 that produced live calves, 48 were remated at an unknown time, to achieve 69% pregnancy.

The larger group of No. 03's which were first mated around March '04 were supplemented at a high level (1.5kg WCS/d for two months before going on to spelled buffel) prior to mating. This achieved an 85% conception rate relative to 66% for the No. 02's which were about six months older when mated as maidens, but not supplemented prior to mating. For these same No. 03's, feeding (spiking) with WCS started very early (approximately 3 months before the start of calving). From about 6 weeks prior to calving there was good rain and good feed. This excessive level of nutrition in the critical late stage of pregnancy may have contributed to the extremely high dystocia level (see discussion below). The group that produced live calves were remated (unknown time) and a sub-set sold before pregnancy testing. Of the remaining 24, 80% were pregnancy tested in calf and 73% produced live calves.

Amongst the No. 3's there was a major loss of calves (33% of those that actually calved or 28% of the females mated) and a significant loss of females (10% of those that actually calved). This followed good rain and feed for the 6 weeks preceding the commencement of calving and 6 weeks supplementation with WCS at 1.5kg/hd/d prior to that. It is probable that this extended supplementation period contributed to the severe calving problem. It would also appear that there may be an inherent calving problem in the herd (15% calf death due to dystocia in the No. 02's), which is made worse by these sort of nutritional conditions. In effect, the nutrition from a flush of green feed is much greater than artificial supplementation but this can not be controlled. However, it would appear that from a spike feeding perspective, artificial supplementation was commenced approximately 6 weeks too early.

A group of No. 4's had some access to oats and supplementation (unknown time and quantity) during the early spring period leading up to their first mating to achieve a relatively high conception rate of 85%. This good result and associated high weights (>330kg) offer the opportunity to bring forward the mating time of maidens. This will have flow on benefits throughout the herd over time. It should also be noted that the pregnancy percentage achieved in yearling mated heifers which had received better nutrition, is the same as the pregnancy percentage achieved in 2 y.o. maidens (the 34 No. 02's that failed to conceive at 18 months and were retained).

In the Riverglen herd, being a seedstock as well as a commercial herd, opportunities to market females often arise. However, the purchasers of these females do not seem to require the females to be PTIC, to have been exposed to a confined mating, or to calve at a time consistent with most of the rest of commercial industry. It would therefore appear advantageous to the genetic improvement of the Riverglen herd to minimise and standardise the age at first mating and timing throughout life, and to use foetal aging to identify more heavily pregnant and therefore more valuable females to retain in the herd (if the length of mating is not going to be reduced). Targeted, cost-effective nutritional management of heifers post weaning and pre mating at 12-15 months of age can be achieved and has been demonstrated elsewhere.

Tarossie

In the Tarossie herd, in the 7 years that the herd has been run on the western Downs as opposed to the much tougher conditions of the central Burnett, yearling mating has been undertaken. The much lower results in the first year (99/00 mating), on light agistment country appears to be a carryover of poorer nutrition and post-weaning growth rate from the previous environment. Similarly, the low conception rate achieved from the 00/01 mating (the first on the 'Tarossie' property), bore the effect of low mating weight and post-weaning growth rate resulting from a poor season and poor nutrition on an agistment property up to that time. Reconception in first calvers was also extremely low. However, since that time, nutritional management has been targeted to achieve approximately 0.5-0.6kg/hd/d from weaning to mating and first calvers have been strategically spike fed prior to having their first calf. The flow on benefits can also be seen in the mature cow herd where pregnancy percentages have increased from the low 80's to mid 90's. The length of mating has also reduced over the 7 year period, from a maximum of 10 weeks to a maximum of 7 weeks for maiden heifers, and from a maximum of 13 weeks to a maximum of 9 weeks for all wet females.

Since the introduction of yearling mating and higher levels of *Bos taurus* genetics to the Tarossie herd, there has been a low level of calving difficulty (approximately 5%), however selection (pelvic measurement of heifers and use of birth weight etc EBVs in bulls) and management practices (nutrition) are targeted at eradicating this.

Conclusions from trial results

Whilst the field work involved in this PIRD does not meet the criteria of controlled experimental conditions and suffered at times from the vagaries of season, it clearly supports the fact that there is great opportunity to enhance the reproductive performance of young breeders in southern inland Queensland.

Certainly there is opportunity to fine tune a lot of the practices implemented by the demonstration herds to more cost effectively achieve the potential benefits, but this will evolve over time. For each enterprise, the challenge is to modify/adapt recommended practices or targets in a practical manner which suits the characteristics of that enterprise.

Effectively improving the reproductive performance of young breeders will depend on the implementation of both genetic and environmental (management practices, nutrition etc) strategies. Some of these effects will be fairly short term (e.g. strategic supplementation), where others will be cumulative and longer term (e.g. selection pressure for higher fertility animals). In summary, a few of the key points include:

a. Strategic supplementation of yearling maidens post weaning and pre mating – typically lower levels of protein meal (e.g. 0.4-0.5kg/hd/d) or low levels of WCS
b. Strategic supplementation (spiking) of rising two year old first calvers – prior to the commencement of calving – typically moderate levels of WCS (e.g. 1.5-2kg/hd/d) or fortified molasses mix (2-2.5kg/hd/d)
c. Modification of supplementation levels each year according to preceding seasonal conditions, current pasture condition, current animal weight and condition etc.
d. Balancing nutritional management of these young first calvers with potential risk of calving difficulty

e. Selecting against calving difficulty in both sires (birth weight, gestation length and calving ease EBVs where available) and maiden heifers (pelvic measurement).
f. Shortening mating periods to make all management inputs (e.g. feeding) more cost effective, and also to provide selection pressure resulting in longer term improved fertility
g. Timing the mating period to better coincide with feed supply and enhance opportunity for young females to reconceive
h. Good herd health (disease management) in both breeding females and bulls
i. Selection pressure on sires to achieve maximum conceptions in short mating periods

Opportunities for further work
The main opportunity for future work in the area of enhancing the reproductive performance of young breeders in this region probably revolves around investigating the causes of calving inertia and milk fever type symptoms in beef cattle in the region, and developing appropriate preventative management strategies. Anecdotal evidence and some localised investigations suggest a link to calcium deficiency and perhaps magnesium deficiency. Regularly, but not always the stock are grazing buffel pastures (where the oxalate ties up calcium) and/or being supplemented with whole cottonseed (which is low in calcium). Reports are probably more regular during tough seasonal conditions, but also often coincide with animals in good condition in normal seasons. Most reports relate to first calvers, but they may also apply to older cows.

The required work is beyond the realms of a PIRD. It is likely that the work would require three phases – a. a scoping survey to determine the extent and nature of the problem, b. clinical investigation, and c. development of management tools to avoid the problem.

Discussion of Group Learnings

Achievement of planned results
For a range of reasons, the results collated from the often sketchy data and the lack of truly comparative data, lacked the rigour to draw statistically valid conconclusions. However, they clearly showed trends that strongly support the benefits that can be achieved.

Impact
Group members now have the confidence that targeted management strategies can cost effectively improve the performance of young breeders and have flow on benefits to breeding herd profitability.

Trial Measurements
The processes for recording, collating and reporting of some critical data could certainly be improved. Not only would this have been a benefit to the reporting of this PIRD, but also for ongoing analysis of herd inputs and performance to improve management on property.

Environmental Benefits
With the implementation of more targeted management strategies (e.g. nutrition, time/length of mating), environmental benefits will arise because pastures are better managed and less overgrazed.

Satisfaction with results
Overall cooperators and group members alike were satisfied with the results. The main negative was the severe calving problem experienced in one of the mating groups.

Had seasonal conditions been a little kinder, the quality of the results may have improved due to the cooperators being in a position where they were more able to commit to ensuring PIRD related activities were conducted in a more timely and effective manner.

How the project could have been improved – what the group learnt
The project definitely suffered from the lack of a paid technical support person to help

- develop and ensure the implementation of 'best bet' treatments,
- determine what data to collect and develop systems to collect, collate and report it
- manage the timing of necessary measurements and activities, and
- encourage a more holistic approach.

Field Days etc
Early in the project a 'farm walk' type activity was held at Riverglen where two Beef Extension Officers ran producers through the issues surrounding the management of calving difficulty (genetic and management/nutritional) and then provided the opportunity for hands on experience in pelvic measurement. Riverglen purchased their own pelvimeter following the day.

At the end of the project a field day for group members was held at Tarossie. This involved discussion of breeder management practices implemented in that herd relative to performance over time, inspection of the breeding herd and discussion of the results of the PIRD.

Acknowledgements

The group would like to acknowledge:

- the MLA PIRD funding and patience of Gerald Martin;
- the efforts of cooperators: and
- Kay Taylor - for providing technical assistance, collating and analysing the raw data, and writing this report.