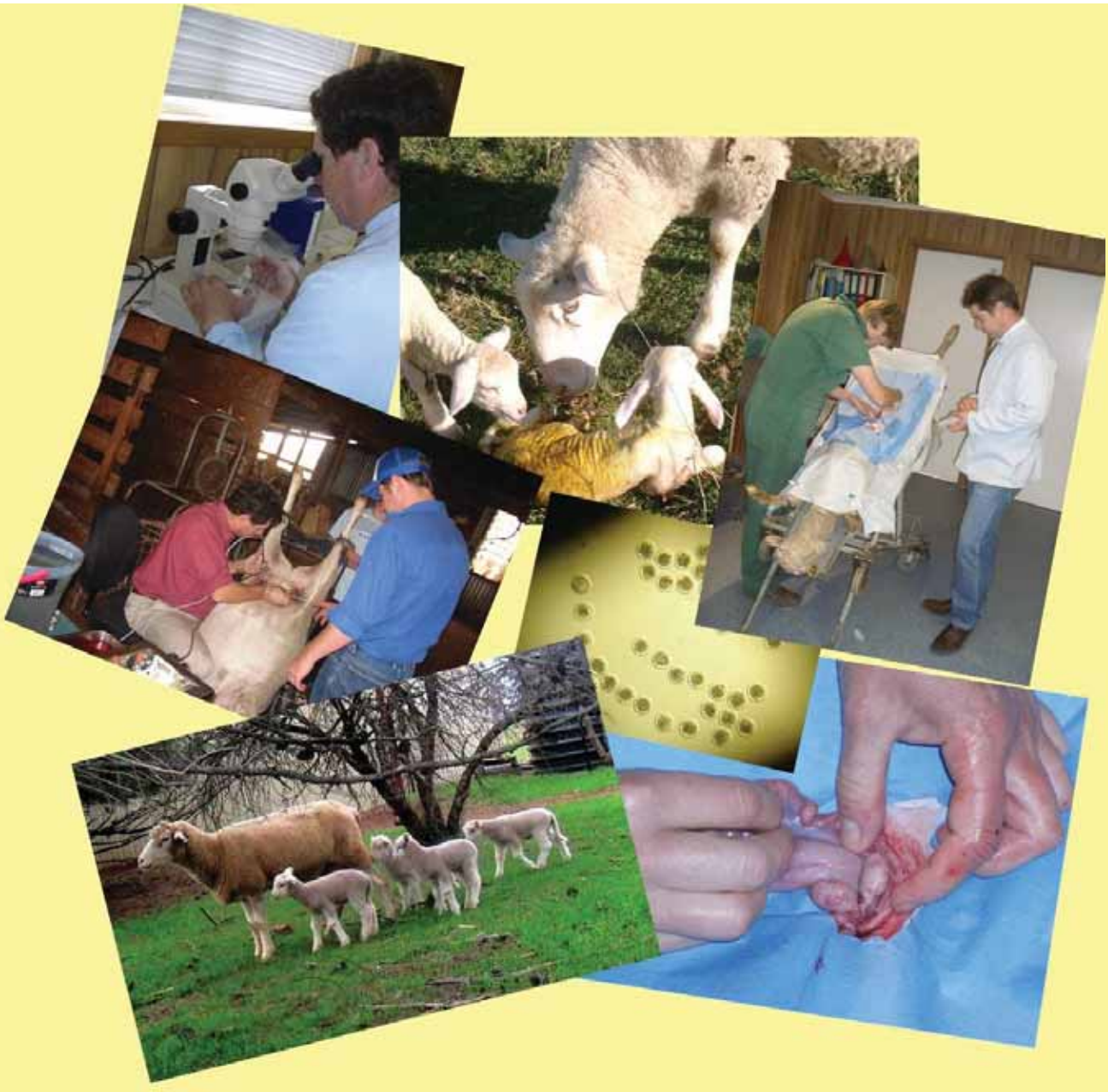
ARTIFICIAL BREEDING TECHNIQUES

IMPROVING YOUR SUCCESS RATE

Proceedings from a forum held at the 2009 Annual Conference of the Australian White Suffolk Association Inc.
Albury NSW Australia
February 2009



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The information contained in this booklet is a collection of experiences and techniques that have worked successfully for sheep breeders over many years using artificial breeding techniques and therefore relates to those who contributed to the information within this publication. It should not be substituted for the advice provided by your AI technician but may provide some useful ideas on how to improve the chance of higher success rates in your breeding program or explain why practices you have used have not resulted in consistent results. The AWSA takes no responsibility for unsatisfactory results emanating form the implementation of information contained within this publication.

At all times, follow the procedures and advice provided by your AI centre.

ARTIFICIAL BREEDING TECHNIQUES

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Chapter 1

Introduction

There is no doubt the increase in productivity and gains made in all areas of sheep production owe much to the increased use and refinement of procedures relating to artificial breeding techniques. The selection of superior animals and their subsequent rapid multiplication, the introduction of new breeds from all sheep producing countries around the world and the ability to shorten generation interval have all provided the Australian sheep industry with an opportunity to make significant gains that would otherwise have not been possible using natural breeding timeframes.

Much has been done to improve the efficiency and success rate of artificial breeding techniques since the first successful insemination on a dog in 1784. Early development of AI procedures for sheep began in Russia in the late 1930's but it wasn't until the early 1980's that laparoscopic AI and semen collection as we know it today began to make some significant refinements, particularly in the areas of dilution, freezing and handling of semen making it accessible to all sheep breeders anywhere in the world. The advancement and improvement of these techniques from the early beginnings of basic "over the rail" cervical insemination using fresh semen to the current embryo transfer programs available has been rapid, resulting in an unlimited number of potential lambs from superior sires that are accessible to every seedstock producer. There is no doubt further advancements in artificial breeding procedures will present many more opportunities as current practices are further refined and new techniques discovered.

There are significant benefits to be gained by utilising artificial breeding techniques. Sires that are physically not available for use by breeders in a natural breeding program are readily available through frozen semen resulting in the quick multiplication of superior sire genetics. The use of Embryo Transfer (ET) and In Vitro technology allows significant reductions in generation interval therefore accelerating genetic gain of superior ewe genetics and also facilitating the import of outside genetics and new breeds from overseas that would otherwise be out of reach of our sheep industry. With the rapid increase in performance testing relating to all areas of the sheep industry, artificial breeding techniques, especially AI, is vital in providing breeders with a means to benchmark their young untested sires against accurate and comprehensively tested genetics. The use of performance benchmarking also provides an opportunity to "hand pick' specific genes within the sheep industry enabling accelerated gains in all areas of sheep production including carcase, fertility or wool traits. With the expected future developments in the area of gene marking for specific traits, the implementation of artificial breeding techniques will play an integral part in the distribution of these traits throughout the sheep industry.

However, despite many years of trials and research, results still tend to be variable and what seems to be successful for one breeder, fails for another. Or does it? Are there some common practices that will ensure a more reliable and cost effective result? This booklet aims to provide some of the guidelines that have worked well for many breeders and should ensure a more reliable result based on many years of experience from those breeders who have had input into this publication. It details management practices that have consistently worked over many years of successful artificial breeding in conjunction with advice from veterinarians and breeding centre technicians who are constantly working in the area of artificial breeding services and trialing new techniques. Despite finding common ground in many areas, there still remains significant variation in conception results that cannot be explained simply by differences in management or technique.

The decision to embark on an artificial breeding program whether it is Artificial Insemination (AI), Embryo Transfer (ET), Juvenile in vitro Embryo Transfer (JIVET) or Mature In Vitro Embryo Transfer (MIVET) will be determined by your breeding objectives, the overall cost and your ability to justify this potential cost against any gains to your seedstock operation. Many breeders who have experienced poor results in the past have tended to justify their resistance to any form of artificial breeding program by identifying it as being too expensive given the cost of the actual genetics in addition to veterinary costs. The significant advances that are currently being experienced within the Australian sheep industry and the promise of even more gains with regard to gene markers and identification of easy care sheep that are ecologically superior, will only highlight the value of highly successful artificial breeding techniques and their value to the future of the sheep industry. By implementing the strategies and practices detailed in this publication, and incorporating them with sound advice from your artificial breeding technician, you will have the best chance of making maximum gains both genetically and economically.

Acknowledgements

Many thanks to the many members of the Australian White Suffolk Association (AWSA) who gave freely of their experiences and provided the majority of the information for this publication.

Thank you to the AWSA Federal Committee for reviewing the information and making it freely available to all within the sheep industry through their website.

Thank you to all who have provided photographs to lighten the content of this publication.

Proceedings of the forum were compiled and written into this publication by Murray Long.

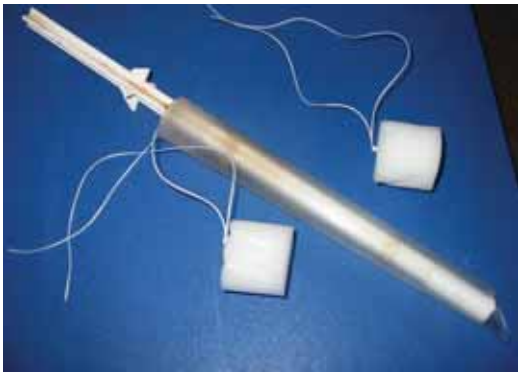
Chapter 2

Artificial Breeding techniques

Synchronization of oestrus

The successful use of all artificial breeding alternatives depends on the ability to successfully synchronise the oestrus in the ewe. This is achieved quite easily with the aid of either a polyurethane sponge or Controlled Internal Drug Releaser (CIDR) containing Progesterone or Progesterone like compounds (progestagens) which prevent the ewe from coming into oestrus through effects on the hypothalamus and pituitary. Once the sponge or CIDR is removed 12-14 days after being inserted into the vagina, ewes will commence oestrus within the next 2-3 days, peaking around 48 hours after removal of the sponge/CIDR. Removal of the sponge/CIDR is usually followed immediately by an intramuscular injection of Serum Gonadotrophin to increase maturation of the ovarian follicle. This injection will also have some effect on ovulation rate and increases the precision of oestrus onset. Laparoscopic Insemination is usually carried out approximately 48 hours after removal of the Sponge or CIDR.

CIDR's are very easy to use and are the preferred method of synchronization by many breeders. They consist of 2 wings which fold together when placed in the applicator and when released, spring out to their original position holding the CIDR in place within the vagina. The plastic tail remains outside the vagina to allow easy removal of the CIDR.
They are without doubt the preferred method to use on maiden ewes however some breeders reported greater losses of CIDR's in older ewes.



Sponges are a little more difficult to use but many breeders find better retention using sponges. The sponge is compressed into the end of the applicator which is carefully inserted into the vagina where the compressed sponge is pushed out with the plunger. The strings are left external to provide a means of removal. Sponges can be obtained in various progesterone strengths depending on the weight and breed of the ewe being synchronised.

Hints

Many breeders find that both CIDR's and sponges are lost over the 12-14 days following insertion therefore interrupting the synchronization of oestrus. The incidence of this will be greatly increased if the ewes are yarded or moved about the paddock in a crowded manner. Avoid any mustering of the ewes between sponge/CIDR insertion and the date at which they are due to be removed, and even then, don't overcrowd or force the ewes into tight mobs.

Sponges or CIDR's can easily be lost just by ewes brushing past each other or nearby ewes being inquisitive and nibbling at the lose string/stem hanging from the sponge/CIDR. When inserting sponges/CIDR's, ensure they are well inserted without any undue pressure and give the ewes plenty of space once released to avoid any early losses of sponges/CIDR's. It is even better if ewes can be released straight into a paddock with plenty of feed. If a sponge or CIDR is not visible when the time comes to remove it, first check to ensure it is not still within the vagina, and if found to be missing, then that particular ewe is not suitable for the program you are undertaking as her oestrus will not be synchronized with the rest of your mob.

Breeders have developed various methods to lessen the chance of sponge/CIDR losses. The positioning of CIDR's so that the wings assume a horizontal position within the vagina on opening tends to result in higher retentions. Some CIDR's also have a small plastic ball on the end of the stem and the removal of this by clipping it off makes it more difficult for ewes to remove it and removal of this ball also tends to reduce the chance of debris buildup on the stem.

Sponges can usually to be inserted further into the vagina than CIDR's and this is vitally important in ensuring they remain in place. Ensure that they are not excessively forced into place as they could penetrate the wall of the vagina, and always make sure both strings are left external to ensure easy removal. If the strings break or the sponge disintegrates, removal of the sponge becomes a little more difficult but will be achieved with patience and persistence. Sponge insertion into maiden ewes can be achieved quite successfully with care although a few ewes will not allow insertion as far into the vagina compared to mature age ewes. Sponge losses tend to be greater than CIDR's in these ewes with shallow insertions.

Hygiene is extremely important when inserting either sponges or CIDR's. Sponges can be coated with an antibiotic powder to prevent infection while the sponge remains in place and tends to work well. Sponges however can be inserted without the antibiotic, provided the applicator is washed with disinfectant after each procedure between ewes. CIDR's require no additional antibiotic and infections are rare.

Breeders indicated no difference in conception rates between the use of sponges or CIDR's and their preference as to which method they used was based on factors such as ease of application and the odour that often accompanies the use of sponges. The retention rates were similar between both and primarily are dependent on management of ewes in the yards following insertion or problems with insertion technique. CIDR's are easier to insert with the ewes in the race than sponges. Sponges are best inserted either by tipping the ewes over in the shed or with the assistance of a mechanical sheep handler. The importance of reducing stress levels in ewes at this stage is paramount in achieving good results.

The intramuscular injection of Serum Gonadotrophin (PMSG) on removal of the sponge/CIDR is one area that can influence the number of multiple births you eventually achieve from your artificial breeding program. The range of volumes injected by breeders ranged from around 1ml to 2.2ml and this was predominately influenced by past results and the fat score condition of the ewes. Ewes that are genetically high in fertility will require less PMSG to achieve desired results and much will depend on the ability of the breeder to manage high incidences of multiple births once lambing commences. Generally speaking, breeders do not want high percentages of triplets or occasional quads as lamb losses are potentially greater and growth rates of the lambs compromised. Most breeders tended to inject around the recommended 2ml of PMSG and adjust accordingly in subsequent programs once they have assessed the results of their lambing.

Breeders reported the use of slightly higher rates of PMSG in maiden ewes giving good results, especially if early in the natural breeding season of the specific breed. This has to be adjusted however, when synchronizing ewe lambs, as the inducement of high levels of multiple births in ewe lambs is not advisable for many breeders.

Once again, good hygiene is essential when injecting PMSG as any infection resulting from dirty needles will potentially cause some severe problems with your artificial breeding program. Ensure needles are sharp and kept as clean as possible.

PMSG is made up prior to use by mixing a diluent with the freeze dried active ingredient. Any unused portions of PMSG that have been prepared with the diluent can be stored in the fridge for up to 3 weeks without loss of activity or frozen indefinitely for use at a later date. Generally, no reduction in the effectiveness of PMSG was observed by

breeders using PMSG that had been frozen for extended periods of time, however several breeders preferred to use any frozen PMSG for synchronized /yard mating programs and preparing fresh PMSG for their AI program.

Be aware that there may be differences in the specific timing of your artificial breeding procedures depending on whether you use sponges or CIDR's as the actual drugs involved to synchronise oestrus are different. Depending on the weight of your ewes, some breeders reported that heavier ewes required the stronger strength sponges to be successfully synchronized, CIDR's in some cases, especially ET programs are not sufficient. Your AI technician will inform you of the timing and process relating to all procedures and these must be strictly adhered to if you are to potentially gain maximum conception rates from your artificial breeding program.

Synchronised joining

The synchronisation of the ewe's oestrus cycle gives you the opportunity to hand mate or yard mate ewes to selected sires. The same preparation is followed as you would for synchronisation of ewes for an AI program except that instead of laparoscopic injection of the sperm into the uterus, ewes are placed with sires to allow natural mating to take place. This may be carried out by allocating ewes to a number of rams in the yard or covered shed or just using a single sire. The ram is placed in with the ewes 24 hours after removal of the sponge/CIDR and either allowed to remain with each ewe until she is served or left with all the ewes for 24-48 hours. This process allows for the effective use of rams, especially ram lambs, without the associated stress of working with mobs in large paddocks over extended periods of time. Preparation of ewes can be spread over a period of time to allow about 5-7 ewes per sire each day, however sponges/CIDR's will begin to lose their effect around 18 days after insertion and ewes may begin to enter oestrus. This restricts the time you have available to successfully complete the program if you have large numbers of ewes.

The timing of a typical synchronised joining program

DAY 0	INSERT SPONGES INTO 90 EWES
DAY 12	REMOVE SPONGES FROM 30 EWES & INJECT WITH 2 ml PMSG (mob 1)
DAY 13	ALLOCATE 6 RAMS TO THE 30 EWES INJECTED FROM DAY 12 (mob 1)
	REMOVE SPONGES FROM ANOTHER 30 EWES & INJECT WITH 2 ml PMSG (mob 2)
DAY 14	ALLOCATE THE RAMS TO THE 30 EWES INJECTED FROM DAY 13 (mob2)
	REMOVE SPONGES FROM LAST 30 EWES & INJECT WITH 2 ml PMSG (mob 3)
DAY 15	ALLOCATE THE RAMS TO THE 30 EWES INJECTED FROM DAY 14 (mob 3)
	REMOVE EWES BELONGING TO MOB 1 FROM THE RAMS
DAY 17	REMOVE ALL EWES BACK TO THEIR PADDOCK

THE REMOVAL OF EWES FROM THE RAMS MAY BE DONE AS THEY ARE MARKED BY THE RAM, OR LEFT AND REMOVED AS A GROUP AFTER 2 DAYS OF JOINING.

Hints

The use of synchronised joining provides many advantages to the sheep breeder including better use of ram lambs, tighter lambing groups, joining of smaller groups of ewes to selected rams and through all this provides an ideal opportunity to benchmark young sires against more accurate sires. This process also provides an opportunity to benchmark your young home bred rams against sires that you have included in your AI program simply by having extra ewes synchronised allowing for allocations to both an AI program and yard mating program. This will result in lambs from both programs being dropped together allowing a very good and accurate comparison between all sires in both programs.

The number of ewes included in one of these programs will depend on a number of factors. The number of rams you are using and the yard space or facilities you have for joining will be major factors in determining the number of ewes you synchronise at any one time, keeping in mind that the time frame for effective ewe synchronisation is 12-18 days following sponge/CIDR insertion. Depending on how you organize your yard mating, a good rule is to allow an average of 5 ewes per ram per day, any more than this and the conception rate seems to drop. If joining in a

yard or confined space ensure plenty of shade, feed and water and try not to join ewes on shed grating as rams tend to be more cautious and may become injured during joining.

A good rule of thumb is to use the following approximation when deciding how many ewes to synchronise at any one time; this allows for any unforeseen occurrences during joining.
Number of rams X 5 ewes per day X 3 day joining period

For example, if you have 6 rams available for your program, you would insert sponges/CIDR into 90 ewes, pulling them and injecting 30 ewes each day for 3 consecutive days. Once the first group of ewes have been injected, either leave them for one day and then put them with their allocated sire or they may be put with the sire straight away. The presence of the ram with the ewes will induce the ewes to cycle in a more condensed time frame. Rams may either have a harness fitted and ewes removed from the mob once they have been marked or they can be left in with the ram for the 2 days following removal of sponge/CIDR and injection. The use of a harness will facilitate the removal of the served ewes the following day when the next groups of ewes are due for allocation to the sire. Theoretically you could have up to 15 ewes with the sire after 3 days and he would still find and serve all the ewes as they cycle. There is some variation in the time taken for ewes to cycle with some cycling within 24 hrs, others may take up to 50 hours so leaving ewes with the ram for around 2 days will ensure all ewes have had the opportunity to mate with the sire. If using young ram lambs, 5 ewes per day could be a few too many so the program may need to be extended to 4 days joining with less ewes per ram per day.

Some breeders have reported better and more condensed service of ewes by the ram if sponges/CIDR were pulled toward the end of the effective time for synchronization, that is day 15-18 after insertion. This may be in some part due to the fact that effectiveness of the drugs contained in the sponge/CIDR is beginning to lose its control and the ewe is beginning to break into an oestrus cycle, however reports are that good conception rates were still successfully achieved.

The behaviour of the rams must to be watched when joining in confined spaces. Some rams will treat the situation as “business as usual” and routinely check all ewes and serve them as required. Some become aggressive with a number of the ewes not yet cycling and, as they are not able to move a great distance away from the ram, may potentially become injured by aggressive rams. Best practice in this situation is to remove the cycling ewes once they have been served by the ram.

Ram behaviour in all areas of sheep breeding can be a factor leading to low conception rates. Several breeders commented that some rams just do not seem to work with mobs of ewes whether it be in a natural mating program or in a synchronized/yard mating program. Observe the rams being used and if they are not working on ewes that are definitely cycling, replace the ram and you will more than likely be surprised that all ewes will join quickly to the replacement sire. Better to do this than to have a large proportion of ewes not in lamb from either a natural or artificial breeding program.

Conception rates using yard joining tend to be a little better than AI simply because of the volumes of fresh semen provided by the ram and marginally lower stress levels experienced by the ewe. Conception rates around 70% are the average, so the use of a backup ram is required in the same manner as would occur following any artificial breeding program. Pre joining nutrition and management of the ewe well before and after any synchronised joining program will greatly influence the result you obtain and these issues will be covered in the following section.

As with all artificial breeding techniques, the use of dogs to muster or move the ewes programmed for synchronization and joining/insemination will potentially lead to lower conception rates. Any practice that may lead to higher stress levels in the ewes will have a negative impact on the results you obtain so the main aim in all artificial breeding programs is to reduce the potential for stress, from any source, on the ewes at all stages in your program. Even the practice of mustering and yarding ewes to swap rams in a standard joining program has been suspected of causing some degree of embryo loss in ewes.

Artificial Insemination

Artificial insemination is by far the most used form of artificial breeding and one that is accessible to almost every sheep breeder. Laparoscopic AI has replaced cervical AI as the preferred means of using semen from selected sires and the use of frozen semen has greatly increased the number of potential progeny that can be gained from a single sire. Laparoscopic AI can be performed in your shed on farm and, once the ewes are synchronized, your AI technician will perform the small operation that is required to place thawed semen into the uterus of your ewes. Ewes are lightly sedated, placed into a cradle that enables them to be restrained and tipped up at an angle that facilitates 2 small cuts to be made where the uterus is accessed using a laparoscope and small measures of semen are injected into each horn of the uterus.

It is important to plan your AI program well ahead of the actual AI date with respect to issues such as management and ewe nutrition. The shed where the procedure will take place should be free of dust and, if possible, be set up to avoid any undue stress to the ewes and allow easy movement of sheep to the insemination area.
Your AI technician will more than likely be responsible for the storage and transport of frozen semen to your property and will have either checked it for quality prior to arrival or will check it prior to insemination. It is a good practice to have a few extra ewes synchronized and ready for AI as a percentage of ewes may either lose sponges/CIDR's or are found to be unsuitable for AI due to problems within the uterus.
Quiet movement of ewes back to their paddock immediately following AI is important.

The timing of a typical AI program

DAY 0	INSERT SPONGES/CIDR's
DAY 12	BEFORE 9am, REMOVE SPONGES/CIDR's, INJECT WITH 2ml PMSG
	ALLOCATE EWES TO DIFFERENT SIRES BY IDENTIFICATION WITH MARKER
DAY 14	BEFORE 12 NOON, EWES INSEMINATED LAPAROSCOPICALLY

Hints

General preparation

For the purpose of this publication, all reference to AI relates to Laparoscopic AI, not cervical AI. Many of the hints contained below are also relevant to ET and the more technologically advanced artificial breeding techniques.

Artificial Insemination, as the most common form of artificial breeding conducted by most sheep breeders can also be the most variable and frustrating. Conception rates can vary the full scale, that is from 0% (unlikely to ever happen) to 100% (hallelujah) with average conception rates around 60-65%. What tends to work for one breeder doesn't for another so a degree of adjustment in technique for your specific conditions and management has to be made. Once you have it working in your favour, AI will become a very cost effective and important tool in your breeding program.

General consensus by breeders is that the ultimate success of your AI breeding program will be determined, not by how you organize the ewes immediately before and during the AI process, but as a result of a well thought-out plan and management months prior to the AI date. Factors such as ewe nutrition, stress of ewes and isolation from any ram influence all seem to have significant impacts on conception rates. Ensure that your AI program is well organized and all preparations are made well in advance as last minute adjustments produce some variable results.

Improved results have been gained by drafting the ewes you intend to AI into a mob of their own, running them separately and well away from any ram influence, either through sight or smell, and keeping this mob as a group in the same paddock for the complete AI process. The introduction of additional ewes close to the AI date will tend to disrupt the group as they establish a new 'pecking order'.

Any measures that can reduce stress levels in the ewes will result in higher conception rates. This applies to all operations preceding and following AI. Ensure all management aspects such as crutching, drenching and ewe selection are carried out well in advance of the AI program. Once the sponges/CIDR's have been inserted, return the ewes to the same paddock preferably with the same feeding regime. Retain this practice for all subsequent procedures including sponge removal and the actual AI operation. When pulling sponges/CIDR's, allocate the ewes to their sires by marking them at this stage to avoid any further disruption than is necessary once the ewes begin to cycle. The use of dogs to work the ewes at any stage either side of the AI process should be avoided. Ewes should be returned to their paddock immediately following the AI procedure, even if the air temperature is high, as any movement the following day is likely to be more uncomfortable for the ewe and result in heightened risk of lower conception rates. Steer clear of any change to their feeding regime at this stage, or at any stage around the timing of your AI program, and if possible avoid disturbing the ewes for at least the first 2 weeks post AI. The introduction of the backup ram should be around 12 days following AI and the ram should be taken to the paddock, not by bringing the ewes to the yard and then returning them with the ram included. Losses of embryos following AI have been suspected when ewes are returned to the yards to introduce the backup ram.

Members reported isolated instances where shearing of ewes a few weeks prior to an AI program has seemingly increased, or not adversely affected, the success rate. There has long been a well supported theory that shearing of ewes increases the conception rates under natural mating regimes, but just how this relates to artificial breeding programs is not known. It has also been suggested that ewes who have recently had their lambs weaned are more likely to respond well to an AI program, it works with cattle so why not sheep. Both these examples tend to have a similar pattern where a stress related incident, followed by an AI program has reportedly given rise to improved conception rates, however it would seem these incidences have been the exception rather than the rule and perhaps their relative success should be kept in context and not become part of an established practice. At all times, avoid any unnecessary handling and stress on ewes around the timing of an AI program.

AI is a procedure where, if the ewe is cycling due to synchronisation, they will have effectively no choice but to be in lamb in the days following the operation. Success of the AI program will depend entirely on how many of these embryos actually 'stick' and are retained through the full term of the pregnancy. The most significant loss of embryos is likely to occur in the first 40 days following AI. It seems that the timing of what would be the 2nd cycle following AI is when many ewes will return to the backup ram if your AI program encounters any problems so the objective is to ensure all measures taken during the first 40 days post AI period are to avoid any excessive embryo 'slip'. If all has gone according to plan before AI, stress of the ewe, including heat stress, seems to be a major factor resulting in lower conception rates following the AI procedure. The placement of ewes in large paddocks where they are required to walk long distances for both feed and water should be avoided and must be a consideration in the forward planning of your AI program.

The timing of your AI program with consideration to the natural breeding season of the sheep breed you are working with will also have an effect on the level of success you gain from any AI program. Breeds that are seasonal breeders will give lower conception rates if 'forced' to cycle outside what would be a natural breeding time for that specific breed. It can be done with some success, but higher conceptions are achieved if the synchronization and AI program is carried out within the time frame that coincides with their natural period of high fertility. Some breeders reported improved conception rates if the AI program is programmed following the autumn equinox, and as some domestic animals use changes in day length to regulate their breeding season, this would tend to make some sense in that this timing would coincide with their natural breeding season for many breeds.

Using ewes that have previously been successfully inseminated is an ideal way to increase success rates. The use of what may be considered good quality ewes that are reluctant or slow to conceive naturally is a recipe for failure and should be avoided. Maiden ewes and ewe lambs will produce some good results but those that fail to get in lamb to AI the first year should be used with caution in following years. The repeated use of AI on ewes generally seems to have no adverse effects on their ability to conceive.

There are isolated examples from breeders where not following what most would consider to be "best practice" for success has produced some very good and surprising results. However there are equally as many examples where not adhering to some simple rules has resulted in poor conception rates and generally speaking, the odds of success are better if breeders stick to what has worked for a majority of breeders over many years of trial and error.

Semen Quality

Semen quality is one area that is largely out of the control of the breeder once the AI program has been organized. Your AI technician is the best judge of the quality of semen that is being inseminated into your ewes and they will usually do a check just prior to performing the AI. However once in the shed with your ewes synchronised and cycling, your options are limited if a batch of semen is found to be defective or low in quality. Prior arrangement of semen from an alternative sire choice can avoid this problem but is often not an option for most breeders as you would expect that any problems with semen quality has been detected well before the technician arrives at your shed. Problems in transport can happen reducing semen quality and semen bought in from overseas, where collection standards can vary, has often not been checked before arrival on your property. If fertility is found to be low, you are left with the decision as to what to do with the ewes. Do you inseminate the low quality semen anyway and hope for the best or do you simply put the ewes with a ram as you would in a yard mating program? Plenty of surprising results have been gained from using low quality semen, when there is not an alternative option, as it seems that motility is at times totally unrelated to the fertility of semen.

Ensure the semen you are inseminating into your ewes has been labeled and identified correctly and is actually from the sire you have selected to use in your program. There have been many examples over the years of major 'mix-ups' using the semen from the wrong ram resulting in some surprising results when lambing time comes around. Once again, this is usually something taken care of by technicians at the breeding centre and, at all levels, semen quality and correct labeling of sires should be standard practice for these laboratories. The use of a standard format for identification when referring to sires, and ordering semen, will reduce any chances of incorrect labeling. This should include not only the individual identification number of the sire but the year of birth always in front of the specific individual identification number to avoid any confusion between the two sets of numbers. 'Nick Names' for rams as the only information on the label is not a good means of identification.

Quality of semen can vary depending on the standards of collection adhered to by the centre collecting the semen and the condition of the ram from which the semen was collected. This aspect will be covered in more detail in the chapter on "Semen collection of Sires" but sires who have been show prepared can sometimes give some variable results if semen is collected either during show preparation or immediately after the show season has finished. Semen from show rams was reported by many breeders as producing variable conception results even though the quality of the semen looks good and passes all benchmarks employed by the breeding centre. This problem has been reported by many breeders over the years when using semen from sires collected at a range of breeding centres, despite the history of these studs consistently achieving better conception rates than others, therefore ruling out any variation in collection techniques.

Teasers

The use of teasers in any artificial breeding program can be beneficial in boosting the ewes response once the sponges /CIDR's have been removed, resulting in a more condensed timing of oestrus. Teasers with harnesses fitted can also be used to identify those ewes within the mob that begin their oestrus earlier and these can be bought forward in the program ahead of the ewes that tend to be a little less responsive. The use of teasers tends to be a personal preference for breeders with no reported relationship between higher conception rates and the use of teasers.

To identify the ewes marked by teasers, the obvious method is to fit them with a harness which easily identifies the ewes that are cycling. Some breeders however use branding fluid or spray marker applied to the brisket of the ram to transfer a mark to the ewe. Branding fluid remains transferable for a number of days and is easiest applied using a large paint brush. Spray marker doesn't last as long but will still be effective in transferring some identification mark to the ewe.

Nutrition

This entire publication could cover the topic of nutrition around artificial breeding programs and still not answer all questions. If there is one issue that continually promotes healthy discussion regarding reasons for success or failure, nutrition is always the centre of attention. Issues such as protein levels in feed available before and after AI, condition score of ewes and how to regulate condition of ewes at every stage of your AI program all promote different views among breeders; however there is some common ground among all theories.

Ewes that are too fat will definitely result in lower conception rates. This is due to a number of reasons including unavoidable stress and inability of the ewe to hold their condition after the AI procedure. There is little doubt that over fat ewes are more prone to stress as a result of movement through the yards and shed and susceptibility to heat stress. As mentioned all through this publication, stress is a major consideration relating to conception rates you obtain from your artificial breeding program and over fat ewes do not allow you to, in any way, successfully manage the stress levels of ewes. The best fat score for ewes being put into an AI program is somewhere between 2 and 3 score and they must be on a rising plane of nutrition leading up to and following the AI procedure. It is this rising plane of nutrition or improving condition score that seems to be the important factor, not the fat score on entry to the AI program. Ewes that lose condition after the AI procedure are more likely to lose their embryo resulting in lower conception rates across your mob.

Many breeders, recognising that their ewes are too fat for the approaching AI program, place the ewes on a crash diet in an attempt to reach an ideal fat score prior to AI. This sudden loss of condition and then the subsequent lifting in the level of nutrition seems to do little to increase the level of conception in most cases, further demonstrating the importance of forward planning well before your intended AI date.

The relative condition of ewes as assessed by breeders tends to vary as well and what is seen by some breeders as ideal for joining is regarded by others as too forward in condition. Ensure you are familiar with the condition scoring system for sheep and try to have ewes around fat condition score 2 to 3 and improving before your AI program and maintaining that improvement right through the program until at least 40 days after AI. There is an increasing theory that the nutrition and management of ewes up to 6 months prior to AI can have an effect on the final result you will get in your AI program and this cannot be corrected with a last minute fine tuning of the condition score of your ewes. **Fat = Failure**

What to feed the ewes before and after an AI program will also invoke much discussion amongst breeders. Generally though it is agreed that a long term elevated level of protein in the diet seems to be associated with lower conception rates. Many breeders flush ewes with protein supplementation just prior to joining to increase the number of potential embryos released and this tends to have no negative effect on conception rate while also increasing the number of lambs born and this practice should not be confused with the implementation of extended periods of high protein diets . Well conditioned sheep tend not to respond to flushing whereas lower conditioned sheep will respond well. However prolonged supplementation of protein, either side of your AI program generally has a negative effect on conception to the point where some very low levels will be achieved. It appears that very high protein diets are associated with reduced levels of progesterone, (hormone required for pregnancy) causing reduced embryo quality and increased embryonic death early in the pregnancy. Diets high in legumes, particularly lush new growth, but hay as well, might also contain phytoestrogens (plant estrogens) that can affect sperm and ovulation, resulting in reduced fertilisation and increased embryonic death.

The topic of flushing ewes prior to AI created a deal of different views amongst breeders, both in the timing and feed used. One breeder commented on the use of barley and high carbohydrate feed for flushing however protein supplements such as lupins and peas were the most common suggestions. The recommended timing and length of flushing was also varied amongst breeder's suggestions with some protein flushing for just a few days prior to AI and feeding just small amounts, some continuing for the duration of the synchronization process and one breeder even being advised to continue past the AI date. General consensus however was that, if you are considering flushing, providing small amounts of protein supplementation for a short period of time just prior to AI is all that was required to achieve a result that will not jeopardise the success of your AI program.

Many breeding centres will recommend using only low quality cereal hay as the best choice for ewes in an artificial breeding program. Obviously for reasons of minimum disturbance, ewes running in a paddock that deliver all their

nutritional requirements is the best option but as most AI programs are carried out during the summer months when natural feed is often of lower quality or non existent, some form of addition feeding is often required. This period of summer also gives rise to the possibility of a good flush of lucerne if it happens to rain; however do not be tempted to rush your recently inseminated ewes onto this high protein pasture as the possibility of reducing your conception rate is very high.

Breeders have also reported different conception rates across different years, using the same batch of semen, in response to feeding different levels of protein. Semen that delivered very low conception rates across a number of studs in one year, subsequently gave good results the following year when even a moderate level of protein was removed from the diet after the AI program. This would tend to indicate that for batches of semen which consistently deliver lower conception rates, protein in the diet only compounds the problem. The problem here is that visually semen can pass all quality controls and only after insemination is it found to deliver variable results. This is often the case with semen collected from rams that have been show prepared or are fat and adds more significance to the problem of feeding even moderate levels of protein in any AI program.

Once the 35-40 day time period has elapsed following AI, it seems there is a much reduced chance that any management decisions you make will greatly influence the survival of the embryo. If your ewes have reached a higher level of condition during this time, there is the option to let them level off or even lose some condition during the middle trimester of their pregnancy, keeping in mind the importance of nutrition and the condition score of the pregnant ewe in the last trimester of pregnancy leading up to lambing. The costs involved in getting your ewes in lamb using AI are not insignificant so don't let inadequate nutrition of the ewe at this stage cause unacceptable losses of lambs.

The topic of mineral drenches and their use in relation to successful conception rates was raised. Good ewe nutrition well in advance (up to 6 months) of your AI program is generally considered critical to any successful program and attention to any mineral deficiencies should be part of this consideration. Selenium deficiency was identified as potentially being a factor in resulting in low conception rates from an AI program.

Climate

Climate or the differences between one season and the next was considered the main reason why we see much of the variation witnessed by breeders concerning success in any AI program. Climate not only has a dramatic influence on composition and nutritional value of pasture available naturally to the sheep, but also affects stress levels and the general management of the sheep flock. High rainfall increases the incidence of worm infestation and potential fly problems, creating a situation where ewes may have to be mustered more often than would be the case if it remained drier. High daily temperatures adversely affect sheep that have to walk long distances to water and feed also reducing time available for grazing, especially if natural feed availability is limited. Heat was generally regarded as the one common factor that can lead to low conception rates, even in natural mating programs, and all efforts to reduce heat stress must be taken.

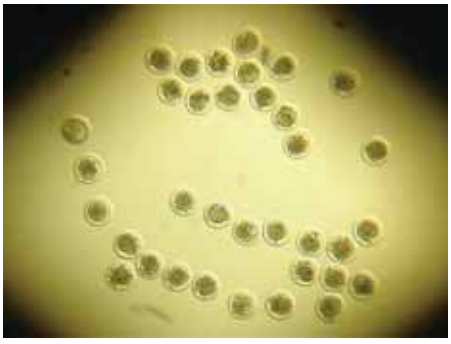
Drought is one factor that has severely impacted on the success rate of many AI programs with some very low conception rates reported. However this may be due to reasons other than the simple condition score of the ewes. Issues such as nutritional imbalances and stresses relating to rearing lambs continually under trying conditions may be the predominant reason for the lowering of conception rates during extended periods of drought. This fact is supported by results from some breeding centres which indicated that many breeders reported good conception rates, in some cases improved results, in the early years of drought and only witnessed a drop in conception rates as drought conditions continued for more than one or two seasons. This could be due to lower body condition actually assisting conception rates, especially for those breeders who had consistently prepared over conditioned ewes for AI.

The significance relating to the influence of climate on conception rates is best supported by the variation within individual breeder's successes using the same procedure that they have constantly been refining over many years. What has tended to give very good results over many years, all of a sudden gives a bad result for no apparent reason except for a change in the season. There is more than likely very little that can be done to avoid these 'one off' adverse results other than to ensure that everything that can be done, is put into practice to minimize stress on the ewes and nutritional deficiencies, which should maximize your potential result.

Embryo Transfer (ET) or Multiple Embryo and Embryo Transfer (MOET)

Embryo Transfer requires a little more attention to detail than AI and, not only involves the collection of fertilized embryos from a donor ewe, but the implantation of these into recipient or surrogate ewes. Whereas AI is an effective means of using the genetics of a superior sire, ET is a technique that allows accelerated duplication of the genetics from an outstanding ewe. The process of synchronization is initially similar to that of an AI program but differs greatly toward the end of the treatment when the ewe is programmed using several doses of Follicle Stimulating Hormone (FSH) to super-ovulate, therefore potentially producing up to 40 eggs for fertilization. AI or natural mating, preferably a combination of both, is then carried out on the ewe and around 6-7 days later, the fertilised eggs are removed by flushing from the uterus. These eggs can then be graded and either directly implanted into a recipient ewe or frozen for use at a later date. The preparation of the recipient ewe must parallel that of the donor ewe if eggs are to be implanted fresh and the quality of these ewes is critical for good success rates using ET.

While ET programs can be accommodated in your shed on property, consideration should be given to the timing, and frequency of drug administrations and the scheduling of both donor and recipient ewes. It is usually advisable to have all the ewes, both donors and receipts, at the AI centre for this procedure. Not all ewes, donors and recipients, will respond to drug treatment, with around 25% of the ewes failing to produce any fertilized eggs, and even then, the quality of embryos from those that do produce can be variable. As with any artificial breeding technique, you achieve some outstanding results and some very poor ones with no apparent difference in preparation of ewes. However success rates are constantly improving as we learn more about all areas relating to ET from nutrition to the handling of embryos.



Embryos from a single flush ready for transplanting into recipient ewes

Timing of a typical ET program

	DONOR EWE	RECEIPT EWE
DAY 0	INSERT SPONGE/CIDR	INSERT SPONGE/CIDR
DAY 11	INJECT HIGH DOSE PMSG/FSH	
DAY 12		REMOVE SPONGE, INJECT PMSG
DAY 13	REMOVE SPONGE	
DAY 14,am	GnRH INJECTION	
,pm	INSEMINATION WITH RAM	
DAY 15	INSEMINATION WITH FROZEN SEMEN	
DAY 20	COLLECT EMBRYOS	IMPLANT EMBRYOS

Hints

Many of the practices that will ensure higher chances of success with Artificial Insemination apply equally to ET programs. As we are dealing with potentially a smaller number of donor ewes, consideration has to be made regarding the quality and potential value of these genetics to your long term breeding objectives. Consideration must also be given to the often highly variable results that can be part of ET programs and the associated high cost if all does not go according to plan.

Once again it is important to pay close attention to the nutrition and body score condition of the donor ewes however this consideration obviously ceases once the embryos have been collected. Very good results have been reported with ewes that are as low as fat score 2 and indications are that ewes with lower body score conditions at the beginning of the program are likely to produce more consistently good results and more embryos than ewes of higher body score condition. As it is likely that the embryo collection process will be carried out at the breeding centre, the transport of ewes to the centre well in advance of any program is a good practice and these ewes should have been run together for some time prior to the commencement of treatment.

This consideration also applies to the recipient ewes as they have to retain and grow the embryos once implanted. The ultimate success of any ET program will be determined by the quality of the recipient ewes. As to which ewes are best for consideration as recipient ewes, it will depend on the constraints you have with regard to disease and just which ewes are available. Many breeders consider Merino ewes the best prospects for recipients as they are basically non seasonal breeders and will hold onto an embryo better if conditions become a little stressed. Crossbred ewes tend to favour their own body condition when stresses occur and will abort the embryo in favour of holding their own body condition. They also tend to be more seasonal in their breeding patterns and this can create a problem when scheduling an ET program that will give you the best chance of high lamb numbers.

A majority of ET programs will make use of frozen semen for the fertilization process however fresh semen tends to work better and many breeding technicians will recommend a combination of both frozen semen using AI and the use of the actual ram over the donor ewes.

The selection of recipient ewes should be based around selecting sound animals with no history of lambing problems or disease. Using cull ewes as recipients will in most cases lead to a disappointing result remembering that these embryos being implanted are potentially your most valuable animals. If possible select ewes that have a history of good mothering characteristics and ensure all vaccinations and drenches are administered well in advance of the timing of implantation. Recipient ewes should be selected well in advance of any program and run together as a separate mob and, as with the donor ewes, nutrition is extremely important with over fat ewes once again a precursor to a less than desirable result.

All the factors such as reducing potential stresses, consistent feed regime, avoiding high protein diets, a rising plane of nutrition over the timing of the program and keeping disturbance of the ewes to a minimum will ensure the best chance of success. The total avoidance of using dogs in the yards with ewes undergoing any artificial breeding program has even greater implication when employing techniques such as ET and JIVET

As with AI, it is better to transport the ewes back to your property or paddock immediately after the embryos have been implanted and then leave them undisturbed for a period of time. There are no guarantees of success with any artificial breeding program, especially ET, but precise attention to detail relating to all areas associated with both AI and ET will increase the chances of a successful program.

Juvenile in Vitro Embryo Transfer (JIVET)

As we move into more technical areas of Artificial Breeding techniques, so the cost and variability of success rates potentially increase. JIVET is the removal of oocytes (unfertilized eggs) from young ewe lambs (2-3 months old) that have been super-ovulated, they are then removed from the lamb, fertilized In Vitro with semen from either one or more sires, incubated for around 4 days to begin cell development and then implanted into recipient ewes. Obviously the techniques involved and the cost take this process out of reach of many sheep breeders, but this has to be considered against the biggest advantage of JIVET which is the significant shortening of generation interval with lambs as young as 6-7 months old potentially having numerous progeny on the ground. Obviously the breeder's confidence in the potential value of these young ewe lambs is paramount to any long term success using this technique.

Hints

The first fact to realize is that JIVET is cutting edge technology where you are challenging the system, is expensive and can give disappointing results. To justify a JIVET program, you must have all aspects of both animal husbandry and business management at a high level. To recover the cost of your breeding program, you need to have a business and marketing plan that firstly justifies the expense and secondly, gives you the opportunity to make financial gains from the program. Basically you need to have a good reason to justify the undertaking of a JIVET program.

The lambs you select should come from a concentrated lambing program either through an AI or ET program. This allows you to make accurate selection based on the early performance of the lambs from the same management group and will also ensure that all lambs used in the program are very close to the same age. The age of the lambs is critical and best results have been gained from lambs at 6-8 weeks old. Lambs programmed at 14 weeks of age produced less oocytes so age of the donor lamb will affect your potential results. You are selecting potentially the best genetics from your young ewe lambs so all areas relating to performance recording must be addressed. The early assessment of lambs as they are born and recording of birth weights which are then submitted into the data base to provide more meaningful performance data is essential in assisting your selection of the potential lambs for the program. All through the JIVET program, organization will be the key word and it begins before the lambs, that will potentially be your donors, are born.

You should also realise that since you are using young lambs to produce your next generation of genetics, the progeny are going to be born out of season and your feeding management will need to be adjusted to allow these JIVET lambs to express their full genetic potential. For most areas this will probably result in lambs being born in the summer months and with the possibility of high numbers of multiple births, provision of shade, clean water and high quality feed is essential to ensure the cost of your program is not wasted once the lambs are born. The other aspect that will affect these out of season lambs is ensuring they are part of a performance management group that will provide good links to the industry resulting in good performance benchmarking.

JIVET technology is traumatic, especially given that you are working with, and handling, the ovaries of young ewe lambs and there is the potential for permanent loss of fertility or loss of the young ewe. These considerations should form part of your decision to undertake a JIVET program but the potential gains can be substantial, especially in the area of significantly shortening generation interval. Programs can typically provide around 70 oocytes per donor of which around 50% will fertilise and, after implanting the fertilized embryos into recipients, 20% of these will result in live lambs. So a typical program using 10 donors will yield around 70 lambs that are 6-7 months younger than their mothers.

The shortening of generation interval is the biggest advantage of JIVET however repeated programs of more than 2 successive JIVET programs have reportedly resulted in reduced fertility. It is suggested that JIVET programs be combined with structured ET and AI programs to avoid this occurring. A suggestion from breeders is to multiply the introduced gene or preferred genetics with JIVET and then put the resulting progeny into a targeted ET or AI

program to further multiply the best selections from this program. This will not only avoid any loss of fertility of the progeny but allow more time for assessment of the performance of lambs from your JIVET program.

JIVET programs are best conducted close to the laboratory that is working with your oocytes. While the programming, collection and sorting can be conducted on property, in vitro fertilsation will take place in a specialised laboratory where they are incubated and subsequently returned to the property for implantation. The process of fertilization will also require that the semen is tested on some commercially collected oocytes prior to use in your in vitro fertilization program. Semen will then be assessed on ability to successfully fertilise the egg which in many cases seems totally unrelated to the visual mobility of the sperm; one (1) pellet/straw of semen will be sacrificed for this process. The batch number of semen must also be recorded at collection as semen from a different batch collection will have to be retested prior to any further JIVET programs.

Contamination in the shed where the program is being conducted is one area that is critical. The shed should be free of dust and the floors washed with disinfectant, the working area protected to minimise wind or any drafts and in general, provide a good sterile environment for both the collection and implantation process. A bug in the shed can not only jeopardise the success of your immediate program but all programs that follow.

There is some evidence that "starving" the recipients for around 4 days after implantation will assist in the take of the implanted embryos. While this has not been categorically proven to be the case, it is a common thought that applies to both ET and JIVET programs which is resulting in improved conception rates of implanted embryos.

Once you have justified the potential gains, detailed attention to the organisation of your JIVET program is the key to success and begins well before the donor lambs are born right through to the planning of your next breeding program using the resulting progeny.

Mature in Vitro Embryo Transfer (MIVET)

Similar principles apply to MIVET as for JIVET except that the donor ewe is mature. This technique is especially useful if the donor ewe is of exceptional quality and has some disorder that will bring about premature death or total loss of breeding potential.

Hints
As for ET & JIVET

Semen Collection of sires

There is little doubt that the discovery of a procedure for the successful freezing of semen, quite by accident in the late 1960's, changed the future for all aspects of artificial breeding. Until then, semen had to be used fresh or chilled meaning transportation of long distances was not possible. Semen collection of sires is reasonably straight forward and the main decision that has to be made is just how much to collect from a specific sire. Rams are usually left at the breeding centre long enough to collect the desired dosages, and this will depend totally on the cooperation of the ram with regard to his willingness to work in an unfamiliar environment. Some rams take time to adjust to "having an audience" and some will work the first time. Often however some small degree of "training" is required, after which it will depend on the volumes being collected and semen quality that will determine the time spent at the breeding centre.

The ram is required to jump over a restrained ewe, semen is collected in an artificial vagina, after which it is assessed, extended with a buffered glycerol and egg yolk mixture, made into either pellets or placed in straws, frozen and subsequently a sample is retested after thawing for quality. On average one jump will yield around 1ml of fresh semen which extends into approximately 40 ewe doses when being made into pellets. Rams that have not collected due to shyness or inferior semen quality, are returned to the owner's property to work with ewes before being returned to the breeding centre.

Electro ejaculation is often used as a last resort for uncooperative rams or if the sire has an injury which hinders his ability to jump. Semen quality is often compromised when collected using electro ejaculation, can easily become contaminated and frequent collections are not possible.

Once the semen has been collected, diluted and frozen into pellets or straws and tested for abnormal sperm after freezing, it can then be stored in liquid nitrogen (-193°C) indefinitely. Whether you are collecting semen from sires for your own use or for sale to other breeders, it is usually the breeding centre that will store and look after the frozen semen for you. Also, depending on the end use of the semen, the breeding centre will give you the option of having the semen licensed by running a series of health tests on both the ram and semen. If there is a chance that you will sell some of the semen, this health check is almost a 'must do' to protect yourself against any problems which may arise as a result of another stud using your semen.

The collection of semen from selected sires is a good means of insurance and will ensure that the genetics are available for use regardless of what happens to the physical sire.

Hints

Semen collection of rams is a very common practice for most stud breeders, however it is one area that still produces some variation in results. With some planning, many of the problems can be avoided resulting in long term storage of high quality semen that will ensure security of your genetics.

Plan your decision to collect semen from particular sires. If you intend to show these sires, collect semen before the high level of feeding begins as rams that have been show prepared or become fat, in most cases will produce inferior quality semen and subsequently reduce the chances of having quality semen available for immediate use or sale. The fact that show prepared sheep are often sitting on straw at a show or the home property, kept in a confined area and supplied with ad lib quantities of high quality feed increases the heat load on the testes with a subsequent reduction in sperm quality. The same applies to over fat rams whether or not they are being prepared for showing. The best quality semen comes form sires that are in good 3 score condition and have not been subjected to any form of over feeding that will dramatically increase body fat levels.

As the rams you are intending to collect are to be shedded and in close contact with the staff at the breeding centre, some degree of training prior to semen collection may be an advantage. Allow the ram to become familiar with human contact as rams that are relatively 'wild' will not usually collect. Having them in the yard, walking around them and feeding them by hand is sufficient to train most rams in the few weeks prior to taking them to the breeding centre. However many rams have cooperated with good success straight from the paddock. Just how your rams will react will only be seen once you are at the AI centre.

Timing of semen collection also plays an important role in the collection of good quality semen and once again, planning is essential to ensure good success. Collection during the cooler months will almost certainly result in more consistent levels of high quality semen when compared to collection during summer. Not only does this tend to coincide with a time when the sire is unlikely to be mating ewes in either the paddock or yards, but the AI laboratories are usually not as busy conducting AI programs during these months.

At what age can rams be collected? Apart from the slight differences between some breeds in maturity patterns, most young rams will collect at around 5-6 months of age provided they are sufficiently well grown. Generally speaking, semen quality from these young sires is equal to that from older, more mature sires, with the added bonus that if anything should happen to the young sire, at least you have the genetics stored for future use. In some instances, these young sires will not cooperate at the breeding centre and they may require some 'training' to collect successfully. This is usually achieved by a short return journey to the property where a few ewes are provided for the young sire to 'practice' on, after which most will collect successfully.

Most rams will collect provided some degree of patience is practiced by the breeding centre but failing this, electro ejaculation can be used. Generally speaking, this is used as a last resort as semen quality is often compromised and the frequency of collections is limited. Apart from this fact, the ram, and often the breeding centre staff, risk injury. Most breeders agreed they do not favour collection of semen using electro ejaculation unless there is no other alternative.

The breeding centre will usually be in control of the freezing, storage and distribution of the semen that has been collected. Quality control of all collected semen, including health testing of both rams and semen, is vitally important in ensuring that the semen collected meets all the health standards that you would expect if you were purchasing semen for use in your own flock. Ensure the rams you are having collected are healthy and have had all vaccination programs and disease checks completed and additionally, when semen is collected, have the semen licensed free of disease. Most licensed semen is tested negative for Brucellosis (blood and semen), Ovine Johnes Disease and Actinobacillus. One of the significant advantages of using semen as seen by many breeders is the reduced risk if bringing disease onto their property, a quick test on all collections will ensure this remains the case.

When purchasing semen, forward planning is one area where potential problems can be avoided. Plan your purchases early so there are no last minute orders that have be dispatched from the breeding centre. Semen can be safely transported in liquid Nitrogen canisters and provided plenty of time is allowed between ordering of your semen requirements and the actual timing of your artificial breeding program, arrangements between breeding centres will ensure the semen arrivers without any unforeseen accidents or problems. There is usually any number of canisters moving between breeding centres resulting in the opportunity to combine several batches of semen for transport, reducing freight costs and also avoiding any last minute rush of semen deliveries which tends to increase the potential risk of accidents or problems.

Unwanted pregnancy

The success of any artificial breeding program hinges on the fact that the ewes selected are correctly mated to the specific genetics that you have carefully tailored to suit your breeding objectives. Whenever there are any numbers of sires in close proximity to your ewes, there is always the chance that accidents may occur and the ewes you have selected could, by accident, become pregnant to a sire that will not produce the intended result. This can throw your artificial breeding program into disarray, especially if a significant number of ewes are involved. If you know or suspect this may be the case, there is a means to 'clean out' your ewes before the breeding program commences by injecting them with a drug called "Juramate". Injection of this product will terminate the unplanned pregnancy, following which, your planned artificial breeding program can continue.
Please contact your breeding centre vet for further information on the use of this product.

Chapter 3

Decision Time

There is no doubt that the use of artificial breeding techniques in any breeding program will fast track the genetic gain within your flock. In many situations, it allows the use of sires that are not available for use by any other means and, as such, provides an important means of using the best genetics the industry has to offer. The level at which you decide to use these techniques will depend on many factors, not least of which is cost. Cost can be justified against potential genetic gain but ultimately the techniques you employ will be determined by the extent of the gains you are striving for measured against the cost and risk that your operation is prepared to take. All artificial breeding techniques come with a risk of lower than expected results but over a number of joining programs, the potential gains should outweigh the risks provided many of the procedures that have consistently produced good results are adhered to.

Always follow the advice provided by your breeding centre and take note of the methods employed by other breeders who consistently have good successful artificial breeding programs. Variability in results is normal and despite the best efforts of many breeders over many years, there is no fail proof secret but there are some common practices that will ensure you have the best chance of success and will result in maximum benefit from the use of artificial breeding programs. It is the factors that are beyond our control such as environment and animal behaviour that will often provide the greatest hurdles; what we as stud breeders have to do is ensure that the factors we can control such as program timing, diet and stress levels in our sheep are consistent with practices that achieve the best results possible.

SUMMARY

- Climate seems to be a major factor in any artificial breeding program
- Reduction of all stress levels in ewes involved in the artificial breeding program is essential
- Forward planning of an Artificial breeding program is essential
- Good ewe nutrition as early as 6 months prior to any artificial program is critical
- Condition score of ewes involved in nay artificial program has a major impact; Fat = Failure
- Semen quality is a major determinant of the ultimate success of your program
- Over fat or show prepared rams may produce lower quality semen despite acceptable visual quality
- Follow the advice of your AI technician at all times