AI
Critical Factors for Success
(2nd Edition)

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Customised Oestrous Plan
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Herd fertility is critical to the success of any breeding pig enterprise. Artificial Insemination (AI) has now started to dominate the reproductive process on many farms in the UK. Amongst other things, it brings superior sire line genetics onto the unit and across many females, which could not normally be achieved cost-effectively by natural matings. If operated correctly, it should also guarantee that each mating is carried out using viable sperm, something which cannot be guaranteed practically with a boar.

Writing this booklet is recognition that the industry has now put the fertility of its herds largely into the hands of the production staff that operates and controls the chain shown below. Any chain is only as strong as its weakest link.

The aim of this booklet is to ensure that the producer has checks which can be controlled and implemented to ensure that the best is achieved from every dose of semen. This booklet does not aim to go fully into all areas of production and reproduction, as individual unit situations vary considerably. It should, however, guide producers in the correct direction for further information or guidance from individual industry experts.

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**Critical Production Factors**

- Selection
- Index
- Isolation
- Health
- Visual Conformation
- Hygiene
- Nutrition
- Welfare
- Veterinary Auditing
- Production Management

- Hygiene
- Boar Temperature
- Collection QC
- Motility
- Morphology
- Density
- Extending
- Packing
- Health Screening
- Bacteriology
- Non-pool
- Independently tested
- Veterinary Auditing

- Biosecure
- Temperature Controlled
- Accurate Delivery
  - Geography
  - Timescale

- Hygienic
- Temperature Controlled
- Rotated
- Stock Controlled

- Correct Short-term storage
- Selection
- Heat Detection
- Stimulation
- Operator Training
- Nutrition
- Welfare
- Health
- Mixing
- Hygiene
- Timing
Each unit within the UK will have four veterinary visits each year, as required by the industry assurance schemes. Ensure that time is allocated during these visits to discuss herd health, bio-security, replacement policy, vaccination programme, etc. Health is critical to the success of any pig unit, whether it is breeding or finishing. And, as the old adage goes, prevention is better than cure.

When considering reproduction problems there are many factors to bear in mind, but the following are the likely areas that the unit veterinarian will cover:

- Health (presence of infectious disease) should not be thought to be the immediate cause of poor reproductive performance. Detailed examination of the system and operation of the AI process should be conducted to identify any possible problem areas. Only when all management factors have been eliminated as possible causes of the problem, should health be investigated.

- Health 'status' and unit health history should be considered. Generally, units with lower levels of disease challenge have a better reproductive record.

- Specific infections that can cause reproductive problems are:
  - Viral infections -
    - Porcine Parvovirus
    - PRRS (Blue ear)
    - Swine influenza
  - Bacterial infections -
    - Leptospirosis
  - Infections that cause fever

- Vaccination and Parasite control policies and their current effectiveness
Correct nutrition of both sows and gilts is important in the reproductive process. Consult your feed company or nutritional advisor for advice on types of diets and feeding regimes.

The KEY areas in the reproductive cycle where nutrition can influence reproductive performance are:

**IN LACTATION**
- Sows/gilts must receive maximum intake of nutrients to minimise loss of body condition during lactation. To achieve this, a specialist lactation ration should be used, fed on a recognised scale (e.g. Stotfold scale) up to the maximum level the sow/gilt will eat. Realistically, this will be around 10kg/head for sows and 8kg/head for gilts.
- Sows/gilts weaned in lean condition, condition score 2 or less (Scale 1-5), will have delayed weaning to oestrus and in fact may take a "rest" until the natural heat 21 days later.
- Sows/gilts weaned, having lost excessive weight during lactation, will be in a low nutritional state and may not even respond to "flushing" at weaning.
- Ideal body condition score at weaning is 2.5 - 3.5 (Scale 1-5).

**AT WEANING**
- Sows/gilts must be fed maximum rations on day of weaning. It is not the reduction of feed but the cessation of suckling that stimulates the process of returning to oestrus.
- "Flushing" of sows on a lactation ration, fed ad-lib or to high appetite, is recommended immediately on weaning, fed through until the sow is served. A rising plane of nutrition between weaning and service is necessary for best reproductive results.

**POST SERVICE**
- Immediately after service, feed levels should be reduced down to 2.25 - 2.5kg/head/day of typical dry sow ration. This lower level of feed intake will ensure maximum implantation of embryos to the uterine wall and reduce variation in piglet birth weight. Note: it may be considered prudent not to reduce the feed level of individual sows/gilts if their condition is considerably below expectation.
- Any body condition improvement following weaning should be achieved between days 21 -> 90 of gestation, though account should always be taken of the condition of the individual.
- Feeding gilts prior to first mating is a complicated subject due to the different regimes operated and should be viewed against the background of unit integration and acclimatisation. This should be discussed in detail with your feed supplier or nutritionist, as these females are the long-term future of the herd and the investment in them should reflect this.

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### Body Condition Score

<table>
<thead>
<tr>
<th>Condition Score 1</th>
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<th>Condition Score 3</th>
<th>Condition Score 4</th>
<th>Condition Score 5</th>
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<tr>
<td>The sow is visually thin; hips and back bone very prominent; no fat cover over hips and backbone.</td>
<td>The hipbones and backbone are easily felt without any pressure on the palms.</td>
<td>It takes firm pressure with the palm to feel the hipbones and backbone.</td>
<td>It is impossible to feel the bones at all, even with pressure on the palms of the hands.</td>
<td>The sow is so fat it is impossible to feel hipbones and backbone, even by pushing down with a single finger. Obese.</td>
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<tr>
<td>&lt; 10mm</td>
<td>11 - 15mm</td>
<td>16 - 18mm</td>
<td>19 - 22mm</td>
<td>&gt; 22mm</td>
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Unit records are useful for many reasons:
- Monitoring overall business performance
- Highlighting key performance indicators
- Helping motivate staff
- Helping to hone performance
- Helping to identify problems

TARGETS
Always set achievable targets and communicate to the stockpeople. We believe units need to be operating around the following levels:
- Conception rates 88-93%
- Farrowing rates 85%
- Born alive 11.5 - 12.0 per litter
- Farrowing Index 2.4
- Replacement rate 40-45% / year

ANALYSIS
When analysing changes in breeding performance, look at past performance (weekly, monthly, 3 months, 6 months and yearly). Is there a seasonal difference? What else changed at around the time in the fall-off in production?

Records required when diagnosing a problem:
- Parity profile (Target - Gilt Pool 4%, P1 18%, P2 17%, P3 15%, P4 13%, P5 12%, P6+ 21%)
- Results by parity. Look at - conception rate, born alive by parity.
  - Is it a gilt or Parity 2 problem? Look at gilt preparation/integration/nutrition
  - Is it a Parity 3 to 5 problem - look at overall serving system/nutrition
  - Is it a Parity 6 problem - look at culling policy/replacement rate
- Sow individual ID. Is there a small percentage of very low productivity sows present?
- Gilt weight/age at first service (Target 220 days+, Weight 135kg+)
- Weaning to service interval (Target 5 days)
- Individual stockperson service analysis
- Exact timing of service AM/PM/AM
- Returns analysis - Regular/irregular
- Weekly target/actual service numbers and number of repeat matings
- Service quality score (1-5) - standing/insemination/run back
- Conception rate by day of the week served
- Cool cabinet temperatures and semen storage records
- Pregnancy testing or scanning results
SEMEN

SEMEN COLLECTION AND PROCESSING
While a number of producers carry out on-farm collection and processing of semen, it would take considerable space to cover all areas which are critical to the success of this operation in the necessary detail. Given the importance of this process, we would recommend that the process is audited by an independent authority on a regular basis, as slight slippage in practices can have a very detrimental effect. PIC UK has the facilities and expertise to carry out such audits for their customers.

PURCHASING SEMEN
The vast majority of producers will purchase their semen from a stud so that it arrives pre-packed in a suitable delivery system such as flat packs. When purchasing semen there are a number of factors which need consideration by producers, as they are buying genetics, health and fertility in one hit. Appendix 1 gives a list of questions on which we believe you should receive satisfactory explanations from your supplier before purchase.

TESTING SEMEN
Semen testing can be a useful tool for both producer and supplier; however, it can be a process which is fraught with its own set of potential problems. We believe that if producers are going to test semen, they should work in conjunction with their supplier to ensure that the testing process is relevant and that the results bring real value to the producer, as there is an obvious cost to on-farm testing. Should you wish to carry out semen testing, PIC UK are able to provide expert guidance and training to any of their customers so that this brings benefit to the process.

DELIVERY
AI Company Courier delivery is considerably more secure, predictable and accurate than the post or external courier. Factors to consider with such a service are:
- Bio-security risk? This vehicle will go between units. What hygiene protocols are in place?
- Temperature-controlled van?
- How is the semen packaged and at what temperature was it dispatched? Should be at 17°C. The company should be able to place a temperature monitoring device to show you the thermal experience the semen undergoes during delivery.
- How many deliveries per week?
- How precise is delivery time?

Postal deliveries are less secure in terms of physical and thermal damage and also guaranteeing delivery time. Having said this, owing to the isolated location of some sites, courier deliveries are either not practical or not cost-effective. Such sites have still achieved excellent results by postal deliveries. This has usually been achieved by the supplier working closely with the postal service and carrying out quality checks and dummy runs to ensure minimal impact on quality and supply.

Temperature-controlled semen storage
- recommended to maintain at 17°C

Checking semen quality
Whichever method of delivery is chosen, the semen still needs to be delivered into a suitable receptacle. This can be directly into a specialist cool cabinet (operating at 17°C) or an insulated box. For bio-security these should be positioned at the edge of the unit and delivery times recorded by the courier. All cool cabinets should be located out of the sun. Semen delivered into insulated boxes should be removed by farm staff before any significant change in internal temperature starts to occur. Staff should record product type, number and use-by date so that accurate stock rotation can be carried out.

**SEmen storage on farm**

Semen should always be stored in a cool cabinet with a target temperature of 17°C. To operate efficiently, cabinets should not be solidly packed as air needs to circulate around the cooling/warming plates and throughout the cabinet. Use of several open-sided baskets to store flatpacks within specialised cool cabinets can be useful to maximise air circulation and aid stock control.

This cabinet should always be kept clean, as any dirt, bacteria, moulds, etc will contaminate sachets and end up on service operatives’ hands.

Semen must be turned or gently agitated at least twice daily to re-suspend the semen in the diluent medium. Records of stock identities, numbers, delivery date/time and use-by date should be kept so that stock rotation can be carried out. This ensures that oldest semen can be used first and expired semen can be thrown away and not used. Such records help to reduce product wastage, improve product quality and highlight shortage of stock, allowing time for the problem to be rectified.

These areas are often neglected but are critical in ensuring optimum product quality at point of insemination. To this end, Appendix 3 gives sample cool cabinet daily check sheets to ensure optimum storage conditions are maintained. In addition to the integrated thermometer attached to the temperature-controlled cabinet, a quality, calibrated thermometer should be used to monitor temperature.

**SEmen handling on farm**

At some point semen will need to be removed from the cool cabinet to the insemination area. This can be anything from a few feet from the cool cabinet to several hundred metres. Because of this, consideration needs to be given to handling. Transportation should ideally be in a temperature-controlled cool box which is secure and hygienic. If it is to be moved in an insulated box without temperature control then the changes in semen temperature need to be monitored. This can be carried out for customers by PIC UK.

Any sachets which are returned from the service area to the cool cabinet need to be logged, monitored and used more rapidly, provided that quality has not been compromised. If you are unsure of the quality implications of doing this, it needs checking. For this reason, and because the process is potentially problematic in itself, PIC UK does not recommend semen warming prior to insemination.

**Remember semen quality is compromised by:**

- Rough handling
- Temperature shock - heat/cold
- Exposure to light

**In the insemination area key considerations need to be given to handling semen. These are:**

- Be hygienic
- Ensure sufficient space to lay out equipment - catheters/gel/cool box and record insemination data
- Keep catheters and equipment free from dust and dirt
- Ensure the stock cannot get access to catheters, semen etc.
- Ensure good lighting (400 lux - bright enough to read a newspaper)
- Supply waste-disposal facilities
For successful AI operation, a customised system should be created which fits the individual unit’s needs. This need not be expensive, but bear in mind that the average service area would be ultimately responsible for several hundred thousand pounds of revenue.

These facilities must have:

- Sufficient pens to grade sows, large/medium/small
- Easy access from weaned sow area
- Sufficient space
- A design to facilitate easy movement of stock and safety of staff
- Space to allow sows to be moved to boars two at a time
- Stock-friendly ambience - non-slip floors/straw
- Good light
- Protection from weather extremes - cool for summer, warm for winter

The design should incorporate:

- Sow-holding area away from boars (pre serving)
- Boar-holding interaction pen with perpendicular bars to allow sow nose-to-nose contact
- Insemination pen alongside boar pen where sows will be tested for oestrus without interference from other sows
- Post-insemination resting pens for sows to continue to assimilate semen without stress
- Equipment-holding facilities for cool box (with power available), catheters, gels, spray markers
- Equipment for handling waste
- Radio for contented stock and staff
- Clock
GILT SERVICE

GILT SELECTION

An organised and efficient gilt system is required which provides a good pool of correctly developed and acclimatised gilts.

- Select gilts for breeding which will be served in 28 days time and will achieve service target age 220+ days and target weight 130-135kg minimum.
- Introduce daily a boar into the gilt group for 5-10mins to stimulate oestrus - no serving unless V boar used.
- Identify gilts in oestrus - record for service in 21 days time.
- Feed levels to be increased 10 days prior planned first service date by 0.5kg/head to “flush” and increase eggs shed.

SELECTING GILTS FOR SERVICE

- Take boar alongside gilt pool to stimulate gilts or into gilt pen if required.
- Record gilts that stand to back pressure best. Gilts must stand for stockperson if AI is to be successful.
- Repeat this stimulation process both AM and PM to identify correct onset of oestrus.
- If gilts stand AM - serve PM.
- If gilts stand PM - serve following AM.
- Serve again 8-12 hours later (Gilts may only be in oestrus for two days).

REGUMATE™ ‘USE FOR GILTS’

Same selection procedure as described.

SELECTING GILTS FOR SERVICE

- Identify gaps in weekly farrowing numbers.
- Select numbers of gilts required to fill this weekly gap, allowing for sows likely to be culled at weaning.
- Create a Regumate™ gilt pool as follows:

  WEEK 1 Select required numbers of gilts (known to have been cycling) - to fill gap in weaning in 18 days time and administer Regumate™ for 18 days. Record ear numbers.

  WEEK 2 Select required numbers of gilts to fill gap in weaning in 18 days time - add these gilts to the Regumate™ group. Record ear numbers to be able to pull these gilts out in 18 days time.

  WEEK 3 Select required numbers of gilts to fill gap in weaning in 18 days time - add these gilts to the Regumate™ group. Record ear numbers to be able to pull these gilts out in 18 days time.

- In this Week 3 remove ‘Week 1’ gilts from Regumate™ on day of weaning of sow group that these gilts will join in terms of production week. The gilts should show oestrus 5 days later.
- Continue the programme described.

* Note: Regumate™ should only be used under supervision from your veterinary adviser.
Accurate heat detection is the key to successful AI. Oestrous detection needs to be carried out slowly and methodically each and every day. Twice daily oestrous detection is preferable, as it does identify the onset of oestrus more accurately, though on outdoor systems this is not always practical. To achieve easier detection, boar contact should only be provided when the stock person is present.

Essential steps for good oestrous detection:

**WEANED SOWS**
- Learn to recognise signs of prooestrus e.g. swollen vulva, restlessness, looking for the boar, sows riding each other (see Appendix 2)
- Keep good records - be observant for signs of oestrus
- Develop a ‘bond’ with the animals - patient and calm approach
- Check for oestrus daily using a boar. Check twice per day where possible, allowing 7 hours minimum between checks
- Boars must be interested and ‘chatty’. Allow them a natural service occasionally
- Boar presence allowing nose-to-nose contact between boar and sow together with stimulation by the stockperson
- Develop a system/routine for each new service week (see centre spread flow chart)
- Direct boar contact at weaning and for the first three days after will quieten sow group and stimulate oestrus - rotating boars will help this process
- Segregation/removal of boar presence at the end of day 3 will heighten sows’ response to the boar when oestrous detection starts on day 4 onwards. Boar introduction (carried out in the presence of the stockperson) causes oxytocin release by the sow.
- Use the back pressure test at the same time as the renewed boar presence, together with flank pressure to determine start of standing oestrus
- Be patient, allow time for a proper response by the sow
- A specialist detection/insemination pen is essential which allows a maximum of two sows at a time to be brought from the weaning pen to the boar for oestrous detection
- Do not take the boar to the sows - take the sows to the boar

**GILTS**
All oestrous identification procedures for sows apply equally to gilts. On many units, gilts are the forgotten part of the herd. Remember they are critical to both the short and long-term success of the herd, as they not only help hit the current service target but are also the next generation of sows. In addition remember:

- Gilts will cycle at any time over a 21-day period (even weekends). Commence boar stimulation at least 21 days before the required date for service
- Take a V boar daily to the gilt pool and allow him to mix with the gilts under stockperson supervision for a minimum of 10 minutes
- Record and mark any gilt showing signs of standing oestrus. This will aid selection of available gilts for service 21 days following and highlight gilts not cycling.
### Start Here

**Farrowing Area / Pre Weaning Area**
- Ensure sows are suckled well by a large litter.
- Ensure high feed intakes 10kg+ (Attention to detail when lactation feeding. Use recognized feed scale.)
- Condition score at weaning target 2.5 - 3.5. Full feed on day before weaning.

**Day Of Weaning - Day 0**
- Remove sows - 7am.
- Grade sows into groups according to size and condition.
- Try to pen parities 1+2 separate from older sows.
- Make ad-lib lactation ration available immediately.
- Ensure good access to fresh clean water.
- Mixing of sows on Day 1 produces some stress so helping to induce oestrus.
- Ensure a generous space allowance when mixing.
- Boar presence required – either alongside or in with the sows. This allows nose-to-nose contact which is essential to stimulate sows to come into oestrus and to settle the sow group.
- Provide a comfortable pen (warm, dry and strawed).
- Light stimulation most important. Strong WHITE light available for 16 hrs/day.

### Days 1 - 3 Post Weaning

- Walk in amongst sows to detect oestrus and settle group.
- Check for bullying.
  - Remove boar presence Day 3.

### Day 4 Post Weaning

- 7am - Start process of oestrous detection.
- Provide specialist insemination pen(s) alongside/in between one or two boars.
- Take sows (maximum two at a time) to insemination pen.
- Allow minimum of 30-60 seconds for familiarisation with boar– nose-to-nose contact.
- Apply back pressure test.
- For sows showing standing response, identify with spray marker and record tag number.

### Oestrous Detection

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<tr>
<th>Once/Day</th>
<th>Twice/Day</th>
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<tr>
<td>AM - Oestrous detection only – identify standing sows and return to weaning pen.</td>
<td>AM - Oestrous detection only – identify standing sows and return to weaning pen.</td>
</tr>
<tr>
<td>PM (4pm) repeat oestrous detection – maximum of two sows at a time.</td>
<td>PM (4pm) repeat oestrous detection – maximum of two sows at a time.</td>
</tr>
<tr>
<td>Those sows marked up on heat AM now serve (NOTE: If less than 25% of sows stood AM, the group is not very advanced in the heat cycle so do not serve PM and only carry out oestrous detection on PM check).</td>
<td>Identify served sows with colour code and give at least 10-15 min rest period before remixing with weaned group</td>
</tr>
<tr>
<td>Sows standing for first time, identify but do not serve.</td>
<td>Sows standing for first time, identify but do not serve.</td>
</tr>
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The whole system needs to be flexible. Time must be made available to ensure that the first signs of oestrus are identified together with twice-per-day insemination where the maximum time between same day inseminations is two days so enabling timing to be perfected and to allow for variations in the heat period. It is important to the breeding period when onset of oestrus could be delayed by 12 hours, with January to July being the better period when onset of oestrus could be advanced. The whole system needs to be flexible. Time must be made available to ensure that the first signs of oestrus are identified together with twice-per-day insemination where the maximum time between same day inseminations is two days so enabling timing to be perfected and to allow for variations in the heat period. It is important to the breeding period when onset of oestrus could be delayed by 12 hours, with January to July being the better period when onset of oestrus could be advanced.
Oestrous Detection
Once/Day

• AM - Serve any Day 5 (1st services) + any remaining sows that stand or still standing.

Twice/Day

• AM - Repeat serve Day 5 served sows up to a maximum of three inseminations. Also serve any newly standing sows.

• PM - Serve any sows that have not been served twice that are standing.

Day 5 Post Weaning

• 7am Repeat process of oestrous detection taking two sows at a time to insemination pen.

Day 6 Post Weaning

• Remaining unserved sows should be showing oestrus.

Day 7 Post Weaning

• 7am start.

• Serve any remaining sows which stand.

Day 8 - 24 Post Weaning

• If sows have to be moved, do it on Day 8. No further moving or mixing after this until day 35.

• Run boar along passageways of gestation house to stimulate returning sows. (10-15 min/day).

Days 24- 28 Post Weaning

• Run catch boar into pens for three week boar returns (5 min/ pen).

• Mark any likely returns.

• Confirmed returns can be served and preferably left in weaned group.

The whole system needs to be flexible. Time must be made available to ensure that the first signs of oestrus are detected. To achieve best results, twice-per-day oestrous detection seems preferable, as allowed. It may be necessary in some circumstances to adopt a three insemination strategy over two days so enabling timing to be perfected and to allow for variations in the heat period. It is important to be aware that onset of oestrus varies with time of year. August to December is the poorer better period when onset of oestrus could be advanced.
The timing of insemination is the single most important factor affecting fertilisation rate and the overall success of AI. If the sow/gilt is inseminated too early (24 hours before ovulation) or too late (after ovulation), the result will be poorer litter sizes and reduced farrowing rates. An AI strategy has to be developed to optimise insemination timing.

Essential information
- Time of weaning must be consistent so all sows can be sorted and bunched according to size and condition
- Weaning-to-oestrus interval varies between sows
- Sows showing early oestrus, say 4 days after weaning, tend to be in oestrus longer (3 days) than sows which come on heat on day 6-7 (2 days)
- The weaning to oestrus interval varies with season and length of lactation
- Body condition of sows at weaning has a major influence on the weaning-to-oestrus interval. Lean sows tend to exhibit later oestrus.
- The best farrowing rates and numbers born alive are associated with longer duration of oestrus
- High feed intake during lactation improves weaning-to-oestrus interval, and consequently improves farrowing rate and numbers of piglets born alive
- Ovulation occurs during the last ½ of the standing oestrus period
- Never inseminate a sow/gilt that is not in standing oestrus
- Average standing to oestrus time can change 12 hours between good/poor breeding times. Typically, oestrus January to May will tend to occur earlier than oestrus September to January.

Key points for successful timing of insemination
1. Research work identifying optimal timing of insemination

Chart 1 (below) illustrates the optimal time for insemination. The bottom axis shows time of ovulation relative to insemination and the fertilisation rate is the number of eggs successfully fertilised. Fertilisation is influenced by the timing of insemination in relation to the timing of ovulation. In sows, it was shown that the fertilisation rate is optimal when insemination occurs between 0 and 24 hours before ovulation.

Chart 1 Average fertilisation of sow once inseminated before, at and after ovulation (Reference: D.W.B. Steverink. October 1999. PhD thesis Wageningen University: Optimising Insemination Strategies in Pigs.)

The predicted time of ovulation is 70% into the standing oestrus period so with a 3 day oestrus period standing oestrus would begin about 48 hours prior to ovulation. A stockperson who is good at identifying oestrus may therefore detect the sow 48 hours prior to ovulation. The chart shows that if the sow is served then with a second service 24 hours later the likely fertilisation rate will be between 20% and 80%.
If, when oestrus is detected, first service is delayed so that it occurs 24 or 16 hours prior to expected ovulation and is repeated 24 hours later at 8 to 0 hours before ovulation, chances of fertilisation rise significantly to achieve a possible 80% to 95% fertilisation.

This time delay before service may have to be adjusted according to the time of year. In poor breeding times (October to January) the time delay given may have to be reduced to 8 hours as oestrus tends to be shorter.

Table 1 shows that optimal time of insemination affects both farrowing rate and litter size. Insemination close to ovulation will maximise litter size.

To work out the optimal timing of insemination for your herd an oestrus plan should be completed at least twice per year - late September as day length reduces and end of February when day length is increasing. Appendix 4 shows oestrus plan comparisons on the same herd but at two different times of year - week 35 (29/8/05) and week 43 (24/10/05). It can be seen that standing oestrus had ‘moved’ to 12-15 hours later.

2. How to make an Oestrus Plan (assuming weaning on a Thursday morning)

The objective is to determine accurately when every sow from that weeks weaning, first shows standing oestrus and equally important when every sow goes off standing oestrus. Using the estimation that ovulation occurs 70% of the way through standing oestrus, a plan can be drawn up for time of service.

POST WEANING

Give boar contact in the weaning pen - Thur/Fri/Sat AM

Remove the boar Saturday AM to allow boar free time until Sunday AM or PM depending when first testing for oestrus will be carried out.

SUNDAY

With two people, run sows in 4s in front of the boar in a free-
Therefore from the above:

- Sows found in oestrus on day 4 AM are left until day 5 AM to be served
- Sows found in oestrus on day 4 PM are served day 5 PM
- Sows found in oestrus on day 5 PM are served day 6 AM
- Sows found in oestrus on day 6 are inseminated immediately

Table 2 is a guide and will need to be modified according to when standing oestrus is first identified.

When reviewing the practices of high-performing producers, the majority felt that three inseminations per oestrus gave superior results.

**Never try to AI a sow that is not in standing oestrus.**

Where producers are unable to operate a twice-per-day heat detection regime, Table 3 gives a guide of a once-per-day heat detection system.

### Table 3 – Example Of Once-Per-Day Oestrous Detection Service Strategy

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Therefore from the above:

- Sows found in oestrus on day 4 AM are left until day 5 AM to be served
- Sows found in oestrus on day 4 PM are served day 5 PM
- Sows found in oestrus on day 5 PM are served day 6 AM
- Sows found in oestrus on day 6 plus or returns are usually inseminated immediately

Table 3 is only a guide and may have to be modified according to unit routine.

### MANAGEMENT POINTS

- Handle sows quietly and gently
- Always use a designated insemination pen where nose-to-nose contact with a boar can be maintained
- Always try to stimulate the sow during insemination with back pressure, flank/udder rubbing
- Always allow sows to ‘rest’ for at least 10-15mins after insemination, before rejoining the weaned group
- Final movement and regrouping of sows should be achieved within 24hrs of the end of oestrus, so that embryo implantation is not impaired. Practically, where groups of newly-served sows are involved, they should not be mixed beyond day 8 post-weaning. Further movement or mixing should not be attempted until after day 28-35 of pregnancy.
- Record all actions to facilitate the learning process
- Record when standing oestrus finishes to help identification of correct timing for insemination
- Do not place sows within sight or smell of a boar immediately prior to entering the service area. Boars should never be housed in the pre-service area.
- Regularly get a fresh observer to review the service regime in operation

### BATCH FARROWING SYSTEMS

All the points in sections ‘Identification of Oestrus’ and ‘Timing of Oestrus’ are applicable to batch farrowing. In addition, consider the following points:

- Due to the large number of sows to be served, several inseminators should be used to reduce inseminator “fatigue”
- Four hours maximum for the total insemination process. This is a guide which will allow roughly equal time between the daily inseminations in a two-service system and time to re-check likely sows in a once-daily mating system.
- Once-daily mating systems should not have insemination going on from dawn to dusk, as this can lead to operator fatigue and inaccuracy
- An efficient process of movement and control of sows is essential, so that staff can accomplish the identification of oestrus and the insemination process smoothly and efficiently without risk to themselves
- Designate the serving week for just that process - do not cut corners
- Ensure monitoring for returns is also made part of the “mating week”
- Treat each sow as an individual, it is batch farrowing not BULK service
ESSENTIAL KNOWLEDGE

The insemination process cannot be rushed. Depending on chosen service timing policy, insemination may be carried out immediately after oestrous detection or may be delayed.

BOAR CONTACT

- Nose-to-nose contact with a ‘chatty’ active boar is essential during AI. The pheromones produced in the boar’s saliva induce the intense receptive period of oestrus, where oxytocin release in the sow causes strong standing response and regular wave-like contractions of the uterus. It is these essential contractions that draw the semen from the gene flat pack, through the uterus and up to the site of fertilisation.
- Sows should be segregated from boar contact for a minimum of one hour (preferably more) prior to oestrous checking and insemination
- Boar contact should be maintained throughout insemination and for the 10 minute ‘rest period’ after insemination, when the uterine contractions will continue to move semen up the reproductive tract
- During standing oestrus, oxytocin is released in surges. These surges generally last for approximately 10-12 minutes.

EXTRA STIMULATION

- The stockperson must mimic some of the stimulation normally provided by the boar i.e. back pressure, flank/udder rubbing.

HYGIENE

- Check hands are clean before each service
- AI is potentially a very hygienic means of fertilising a gilt/sow. It eliminates the possible transfer of infection from direct contact with the boar. Clean the vulva with a dry paper towel to clean away dirt that may contaminate the head of the catheter. The catheter should only be removed from its polythene cover immediately prior to insertion. Do not hold the catheter in the mouth and always use a new catheter on each sow.

CATHETER INSERTION

- The lips of the vulva are gently parted, to allow the head of the catheter to be inserted and to have contact only with the interior of the vulva. The head of the catheter is inserted into the vulva and gently pushed forward and upwards at an angle of 45 degrees into the reproductive tract, being careful to miss the entrance to the bladder. When a firm resistance is felt, the catheter is pulled slightly back to achieve a firm lock.

INSEMINATION

- Once the catheter is firmly locked in place, the flat pack is raised above the level of the vulva to an angle of 45 degrees above the horizontal. The uterine contractions will suck the semen out of the flat pack, into the uterine tract. With a good insemination, this process will be completed in 2-3 minutes but may take up to 5 minutes.

POST INSEMINATION

- The catheter is left in the sow for 5 minutes to continue the cervical stimulation and maintain uterine contractions. At the end of semen uptake, the catheter should be doubled over and bound in this position by threading the ‘bend’ through the hole at the end of the flat pack. This prevents ‘back flow’ of semen. Record quality of insemination by scoring 1-5. This will be useful at a later date to analyse effectiveness of service. Allow the sow to rest for 10 minutes and then return her to her weaned group.
- Record any events like bleeding
Patient, calm and enthusiastic staff working as a team will achieve the best AI results

Batch farrowing can place an unacceptable burden on the three serving days if there are only limited staff numbers available to carry out the AI process

Insemination cannot be rushed and must not become a "chore"

Inexperienced operators should receive on-the-job training in principles and technique

Pregnancy detection is an integral part of the insemination process as returning sows need to be identified immediately and appropriate action taken

Climatic conditions both inside and outdoors can dramatically influence reproductive rate. Sows must be kept in warm, dry and draught-free conditions with freedom from stress.

Attention to detail, with recording and detailed analysis of accurate records, can go a long way to identifying the problem areas in an AI system
APPENDIX 2

Signs of oestrus
Stockpersons must be aware of the full range of signs of proestrus to oestrus and be able to understand some basic reproductive physiology in order to accurately predict the timing of ovulation. The infusion of quality semen at the right time in the right place is essential to successful AI.

The following key points will outline the basic rules:

Proestrus
This is the period just prior to standing for mating, when the gilt/sow becomes restless and is easily disturbed – duration around one day.

A proestrus female may:
- Have a swollen and red vulva (more typical in gilts but not consistently in sows)
- Climb up gates and walls
- Produce a watery discharge from the vulva
- Emit a high-pitched whine
- Mount other females but not stand themselves

Oestrus
This is the period during which the sow is prepared to stand for mating.

An oestrous female may:
- Have a normal vulva (swelling and reddening subsides)
- Stand with tail upright and flicking up and down
- Have a poor appetite
- Become very vocal - repeated grunts or long growls
- Display pricked ears
- Show ‘standing reflex’
- Stand with arched back
- Have glazed eyes
- Tremble
- Have a tacky discharge from the vulva
- Be attracted to stockperson
- Seek contact with the boar – if allowed
- Stand rigid if mounted by other females
- Be able to withstand the “back pressure test” in the presence of the boar

Not all of these signs will be seen in any one female. Different females exhibit oestrus in different ways and the “art of the stockperson” is to be able to clearly identify and respond to the various signals displayed.
Samples of these charts can be obtained from PIC

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**Gene Transfer**

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**SEmen Quality Control Chart**

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**Gene Transfer**
Examples of oestrus plans

### Appendix 4

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**Number of Days Sows are on Heat**

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**Day of Weaning:** Thursday

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**Time of Heat Check:** 8:30AM, 9:00AM, 9:30AM, 10:00AM, 10:30AM, 11:00AM, 12:00PM, 1:00PM, 2:00PM, 3:00PM, 4:00PM

**Day of Weaning:** Thursday

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Sperm penetrating ovum.
Time service correctly to maximise fertility rate.
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