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Artificial Insemination

Insemination of pigs

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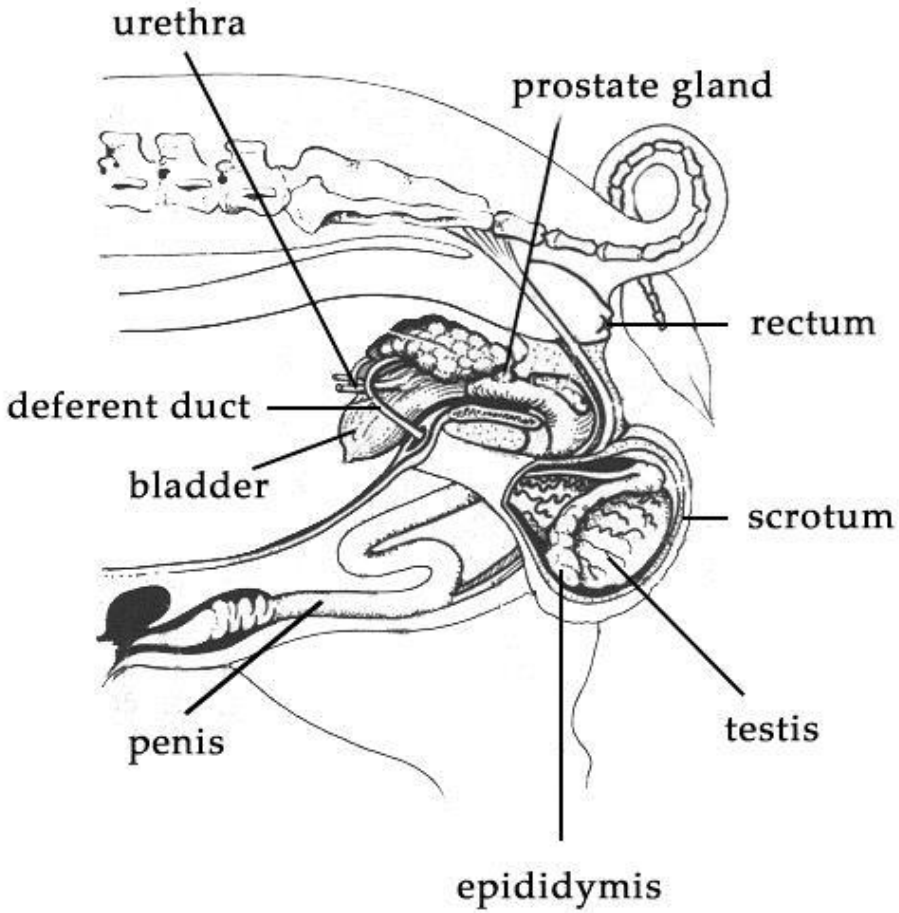
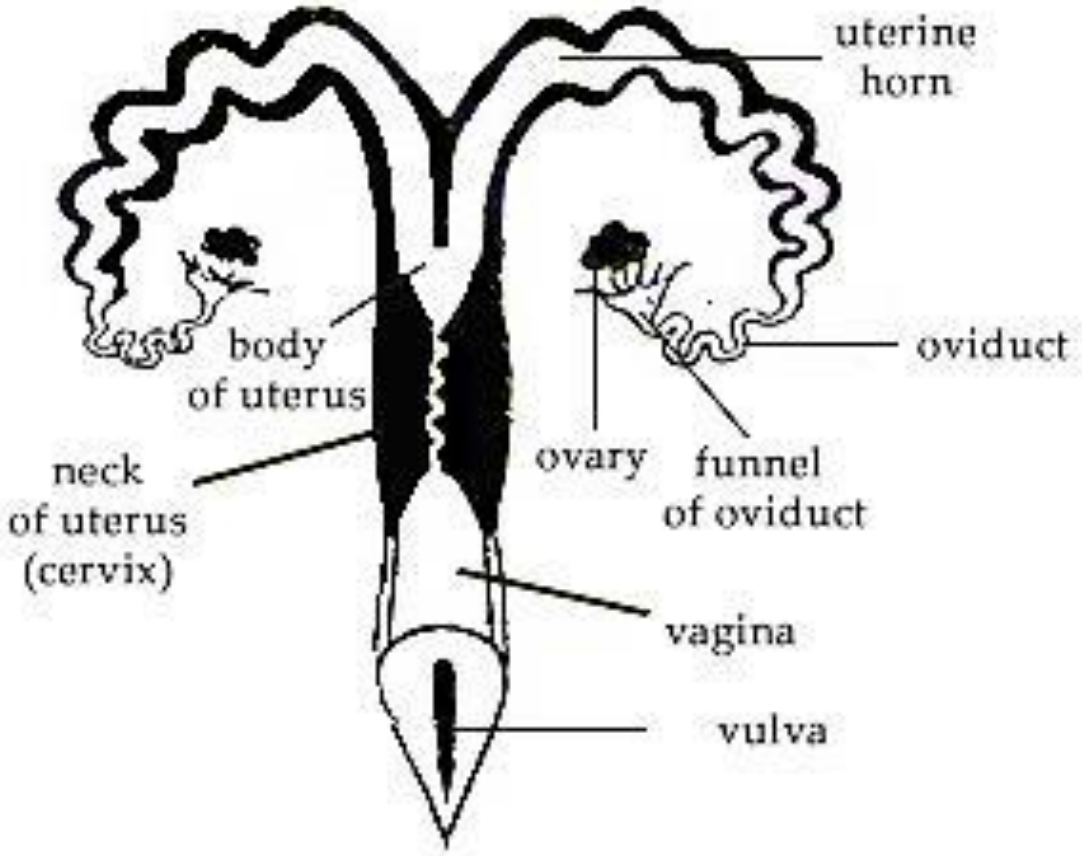
Importance

- **Maximal use of quality boars**
- **Effective tool to refine work**
- **Faster improvement of utility and reproduction characteristics**
- **Use of boar till the age of 7**
- **Group fertilization of sows at factory farms**
- **Production of uniform material for fattening**
- **Fertility control of boars**
- **It is possible to fertilize young gilts regardless the boars**
- **Veterinary control of boars‘ fertility**
- **Economic effectiveness**

Anatomy of genitals of pigs - Male‘s genitals



Anatomy of genitals of pigs - Female‘s genitals



Carrying out of insemination

- **Delivery method:**
  - **90%, breeder buys insemination dose and provides insemination himself**
- **Enterprise method:**
  - **10%, in the company they produce insemination dose for own consumption**
- **Service method:**
  - **Breeder orders insemination for a fee**

Sexual maturity and use of breeding boars

- **Libido sexualis at the age of 4 – 6 months**
- **At 8 months fully fertile, it is possible to use them**
- **For breeding at the age of 9 – 10 months (at the earliest at 8 months)**
- **Purchase of boars at auctions (6-9 months) or breeding stud and reproductive stud**
- **About 15% of boars are eliminated, failure in sampling of ejaculate**
- **Size measurement of testicles and tissue elasticity**

Minimal requirements for ejaculate

- **Cubic capacity 100 cm3 (by 12 months 80ml)**
- **Number of sperms in 1 mm3 : 150,000**
- **Activity of sperms: over 70%**
- **Pathological and immature sperms: up to 25%**
- **Ability to jump on phantom**
- **Percentage assessment of pregnancy after the 1st insemination, requirement 50%**

Sellection of boars for insemination

- **According to breeding value**
- **According to quality of sperm**
- **According to libido sexualis: it is inherited, it decides on the jump on phantom, on the heat of female offspring (expressive heat) necessary choice of vital boar (it means strong stable or strong unstable neuroconstitutional type)**
- **Unilateral breeding for meat yield decreases libido sexualis**
- **First samplings on mobile dummy in own hutch**
- **Quarantine for 4-6 weeks (from 7 months there are exams – 5 jumps)**
- **Tested boar – certificate at auction (additional charge)**

Practice of boars on phantom

- **Quiet treatment**
- **Eliminate disturbing noises, odors, objects**
- **Practice can take for 1-2 months, before ejaculate is gained**
- **Boars must be bred individually, separated from sows**
- **Movement in pen is recommended (0.5-2 hours)**
- **Clean and wash regularly, permanent keeper**

Practice of boars on phantom

- **Visual sensations affect start of sexual reflexes = immobile contour of back**
- **Distance reflex – it is interested in phantom, tries reflex of immobility of seeming sow → erection reflex**
- **Copulative movements follow – spiral movement of penis**
- **Insertion into artificial vagina or taking into hand, boar calms down, ejaculation starts**

Sampling of sperm

- **Ejaculation in waves = faction:**
  - **Presperm (5-20%)**
    - **Clean urethra (yellow liquid)**
    - **Bacterially polluted liquid**
    - **Causes inflammation of sow‘s genitals and running around**
    - **Must not get into ejaculate**
    - **Secretion of urethral glands**

Sampling of sperm

- **Ejaculation in waves = faction:**
  - **Sperm (30-50%)**
    - **Rich in sperms**
    - **Creamy colour**
    - **Secretion of epididymides, small portion of secretion of spermatic sac+prostate**
  - **Postsperm (40-60%)**
    - **Secretion of Cowper‘s glands + secretion of spermatic sac**
    - **Jellied and sticky consistency-plug entrance into cervix**

Sampling of sperm

- **Production of sperms during 1 day:**
  - **1-year-old boar:$13x10^9$**
  - **2-year-old boar: $25x10^9$**
- **For 1 sampling on the average $40\text{-}50x10^9$ sperms (up to 90)**
- **Optimal number of samplings 4-6 per month (older ones 8-9)**
- **Minimal break for 3 days, maximal 10 days, optimum 5-6 days**
- **Sperm = 3-7% sperms, 93-97% plasma**
- **Cubic capacity 200-300ml**
- **Concentration 250-300,000/mm^3**
- **Activity 60-90%**
- **Lenth of sampling 7-10 minutes**

Manual sampling

- **Minimal macrobial contamination**
- **At searching movements secretion of prepucium drains away and there are several spurts of the 1st faction**
- **Grab penis with hand – fixation**
- **Straighten S shape**
- **Frictional movements stop, boar calms down**

Manual sampling

- **Ejaculation starts, visual control is possible**
- **Pressure on the end of penis**
- **Sperm smells of milk, less of boar**
- **Very dirty sperm has strong boar‘s smell (urine, epithelium of foreskin sac)**
- **Filtration of ejaculate through gauze into collector**

Assessment of sperm

- **Macroscopic: colour, scent, consistency, admixtures, cubic capacity**
- **Microscopic: movement, concentration, pathological sperms, quality of acrosome, quality of flagellum**
- **Oxidative metabolism = by 20% more energy from fructose than bull‘s, without O_2 movement stops**
- **Sperms are exhausted in 6 hours (low content of fructose) – loss of movement**

Assessment of sperm

- **Life extention by dilution**
- **Optimal dilution 1:6 – 10 (in insemination centres for boars 1:15)**
- **At boars to 12 months ratio 1:12**
- **In insemination dose optimally 3-3.5 x 10^9 sperms**

Requirements for quality of sperm and insemination dose

- **Fresh sperm after sampling:**
- **Milky to grey-white colour and other typical qualities of sperm (consistency, odorless)**
- **Cubic capacity min. 100ml, at young ones until the age of 12 months and at breed Duroc up to 18 months min. 80 ml**
- **Density min. 150,000 sperms in mm^3**
- **Min. 70% active, min. 75% morphologically normal sperms**
- **It does not contain neither pathogenic microorganisms nor massive finding of nonpathogenic microorganisms**
- **It does not contain strange admixtures (blood, urine, pus..)**

Requirements for quality of sperm and insemination dose

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  - **Density min. 150,000 sperms in mm^3**
  - **Min. 70% active, min. 75% morphologically normal sperms**
  - **It does not contain neither pathogenic microorganisms nor massive finding of nonpathogenic microorganisms**
  - **It does not contain strange admixtures (blood, urine, pus..)**

Requirements for quality of sperm and insemination dose

- **Short-term preserved sperm:**
  - **Min. 1.5 x 10^9 active sperms in one insemination dose**
  - **Cubic capacity of one dose min. 80 ml**
  - **It does not contain pathogenic microorganisms**
- **Long-term preserved sperm:**
  - **Activity of sperms after defrosting min. 30%**
  - **After defrosting it contains min. 2.5x10^9 active sperms in one insemination dose**
  - **It does not contain pathogenic microorganisms**

Preservation of boar‘s ejaculate

- **One-step dilution (in collector – Deutsche Pig)**
- **Two-step dilution (Kare I, II)**
- **Objective:**
  - **Provide high quality of insemination dose**
  - **Solve operational and economic problems**
  - **Limit the duration of the expedition**

Preservation of boar‘s ejaculate

- **1st phase of dilution:**
  - **In insemination centres ejaculate is pre-diluted with thinner I**
  - **Immediately after sampling we add 10% of thinner (cca 20 ml)**
  - **In 5-10 minutes ratio 1:1**
  - **In 20-30 minutes we finish dilution according to number of sperms**
  - **We subtract immobile sperms (10-30%)**
  - **We subtract pathological sperms (10-15%)**
  - **Calculation of number of ID:**

  Number of active and healthy sperms x cubic capacity : 1.5 = number of doses (40)

Preservation of boar‘s ejaculate

- **1st phase of dilution:**
  - **Cubic capacity of diluted dose 40 or 50 ml**
  - **We dilute max. into 60 doses from a jump**
  - **At dilution temperature must not fall below 20°C (optimum 25°C)**
  - **Used thinner Kare I. slows activity of sperms**
  - **Diluted sperm is filled into plastic bottles - 200 or 500 ml**
  - **Bottles are labeled with registry, date, number of ID**
  - **Gradually it is cooled down to +18°C (+16°C)**
  - **Temperature must not fall below 15°C**
  - **It is possible to keep by 72 hours**

Preservation of boar‘s ejaculate

- **2nd phase of dilution:**
  - **Diluent Kare II reactivates sperms, it is dispatched in insemination bags of PVC (50 or 30 ml)**
  - **Insemination dose and diluent 16-18°C**
  - **Next dilution always before insemination**
  - **We put in 50 ml of diluted sperm into insemination bag**
  - **Total cubic capacity of insemination dose is 100 or 80 ml**
  - **Insemination dose is not warmed up, must be used up by 1 hour**
  - **Pregnancy after 1st insemination 80-85%**

Insemination of sows

- Heat for 1.5 – 2.5 days (gilts 120 kg, 8 months)
- 3 phases:
  - Proestrus: cuddly, jumping at each other, reddish vulva, for 2 days
  - Estrus: ovulation for 30 – 40 hours since the beginning
    - In the 2nd half - immobility reflex → insemination
    - Ovulation lasts for 4-7 hours
    - On the average 12 egg cells ovulate at young ones, 15 eggs at older ones
  - Postestrus: symptoms fade out
- Carry out insemination 12-18 hours after the beginning of heat, reinsemination in next 12 hours

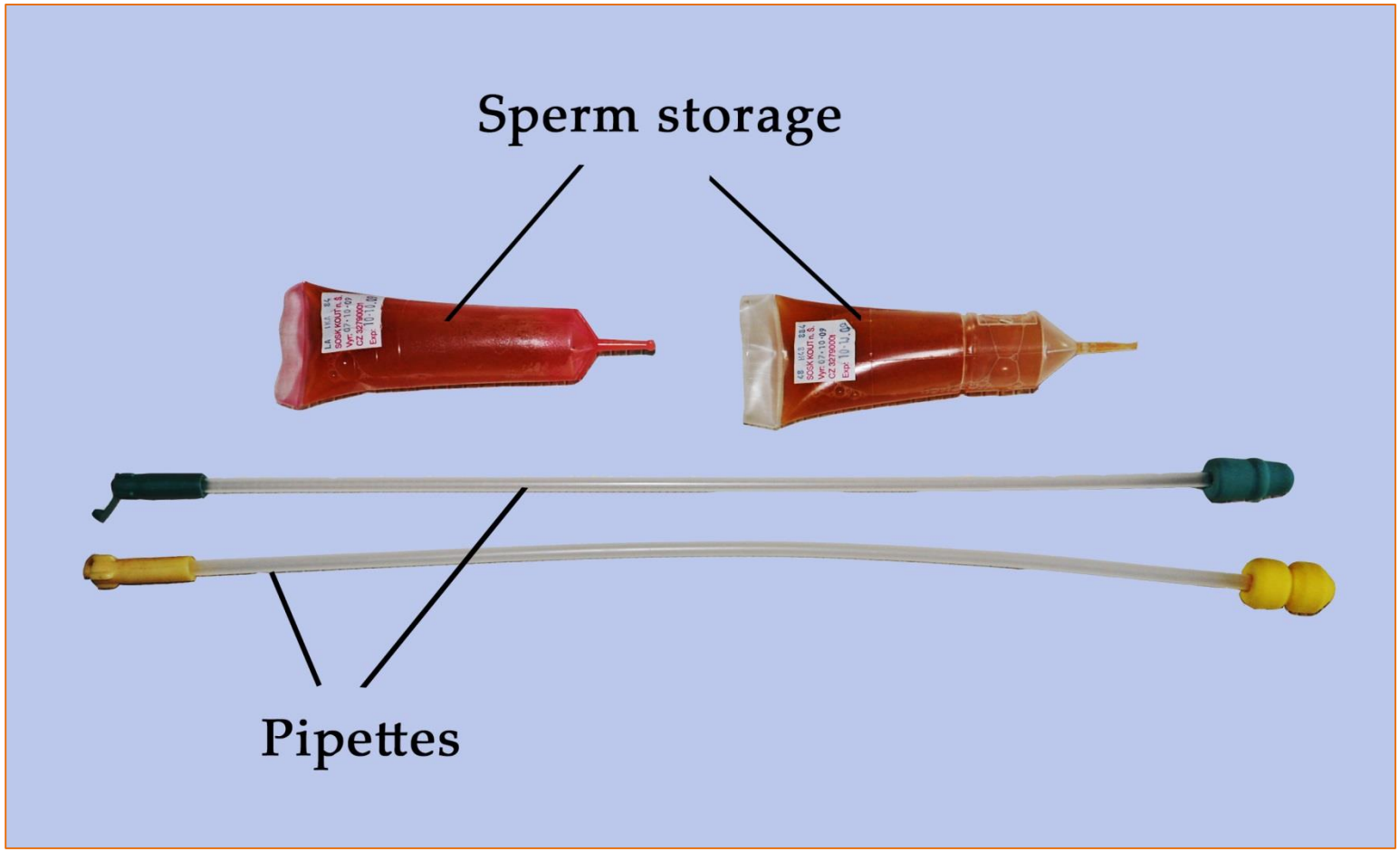
Insemination of sows

- **Sellection of sows twice a day using a boar or touch stimulus of a man**
- **Heat 4-10 days after weaning of piglets**
- **1st insemination – in the afternoon at 4 p.m.**
- **2nd insemination – in the morning at 6-7 a.m.**
- **3rd insemination (if it stands) – in the afternoon at 1 p.m.**
- **In winter season -2 insemination doses to become pregnant, in summer -3 ID to become pregnant**

Insemination of sows

- **Before insemination clean vulva with tampon**
- **Touch on groin, loins – thrill**
- **Put in insemination equipment under upper vaginal vault into cervix**
- **Adequate pressure, rotational movement**
- **Wait for sucking in of sperm by uterine contractions**
- **Do not put in sperm by force**
- **Capacitation for 3-4 hours, run of sperms for 20-30 min**
- **Synchronization can be used**

Instruments for insemination



Cryopreservation of boar‘s sperm

- **Freezing in pellets: 0.16-2.0 ml**

  in pejets: 5-10 ml (more suitable)
- **Pregnancy lower by 10-20%**
- **Coming through acrosome – decrease of fertilization ability**
- **Importance: more efficient use of inovators, speed-up of upgrading processes**
- **Activity after defrosting 30-50%**
- **Number of sperms in insemination dose $3\text{-}6x10^9$**

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