ECVET Units as Initial or Additional Training to the European Veterinary Assistant Diploma
No. 2016-1-LV01-KA202-022652

Artificial Insemination

Insemination of sheep

Funded by the European Union 2016-1-LV01-KA202-022652

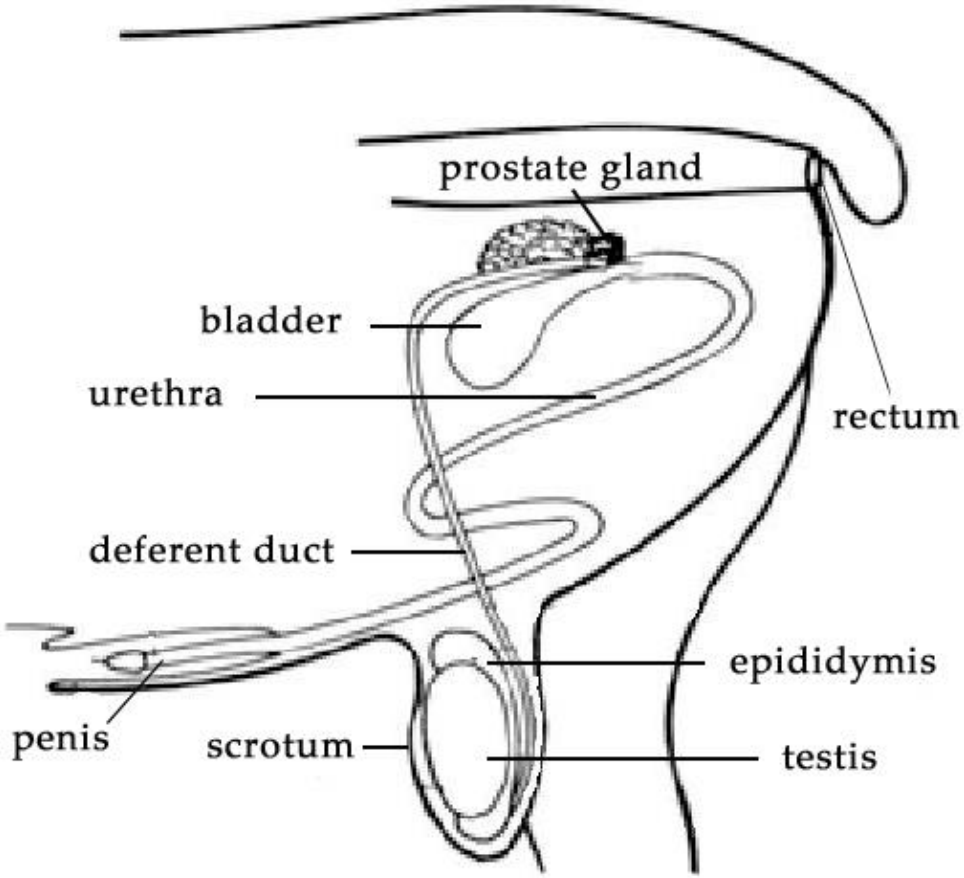
Fertility of sheep

- **Period of sexual rest – anestrus**
- **Fertile period - relationship to latitude, in the second half of the year → daylight is getting shorter = fotoperiodismus**
- **Second wave of fertile period is in spring, manifestations of heat are weaker**
- **Influenced by pedigree, length of postnatal period, length of giving suck to lambs or milking**

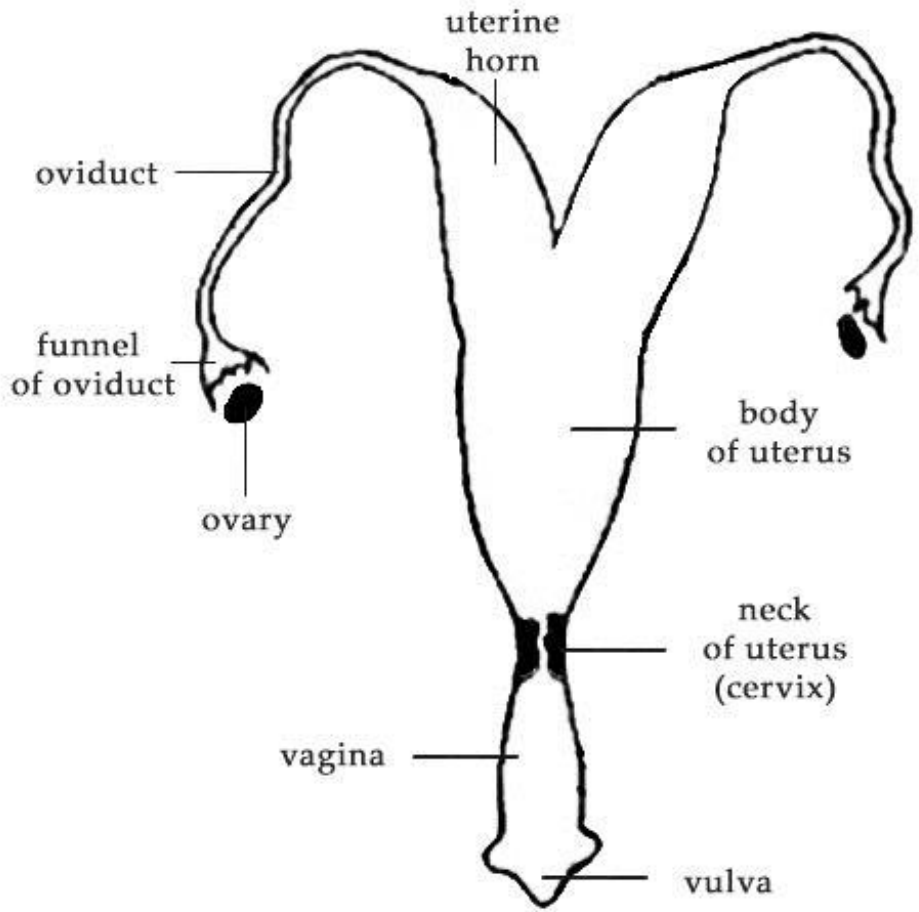
Fertility of sheep

- **Breeds with combined and meat efficiency - fertility 140% (Merino, Valachian Improved, Merinolandschaf, Charollais, Berrichone du Cherr)**
- **Dairy breeds - fertility 200% (East Friesian)**
- **Fertile breeds – fertility over 200% (Romanov – 250 – 320%, Cambridge, Booroola)**

Anatomy of genitals of sheep - Male‘s genitals



Anatomy of genitals of sheep - Female‘s genitals



Sexual activity of rams

- **Period of adolescence from 4 to 6 months of age**
- **At 8 months adequate manifestation of sexual behaviour**
- **Desire to jump (libido sexualis, service capacity of ram) – testing by using „pen test“ = putting a ram into a hutch with ewes in heat, watching the number of mating for 20 min – 1 hour**
- **Ram with good service capacity covers 5 ewes in 20 min, it mates with heating ewe by 2 minutes**

Sampling of semen

- The same type of artificial vagine like at bull, 20cm shortened
- Glass collector or one made of nonspermicidal plastic film
- Temperature in vagine 41 – 430C, grease with sterile vaseline
- Preparation of ram is the same like at bull
- Special covering – we can use heating ewe as imitation
- Sampling – once-twice a day, 5 times a week
- On the average 50-200 insemination doses a week from 1 ram

Assessment of semen

- **Macroscopic assessment: colour, grain size, scent, admixtures**
- **Microscopic assessment:**
  - **activity: straight move forward behind head**
  - **concentration: Bürker cell, 1% solution of NaCl**
  - **dehydrogenation testing: only vital sperms have dehydrogenation activity (production of enzyme) , how long it takes to change the colour of the solution of methylene blue**
  - **warm test of survival: we dilute 0,1 cm^3 of semen in physiologic solution, incubation for 10 min at 47,50°C, assessment of activity**
  - **determination of pathological sperms: staining by Farelly**

Quality of semen

- Quality depends on season – in autumn it is the best
- It must not contain admixtures
- Creamy colour, grainy, typical scent
- Density should not be lower than 2 x 10^6 in mm^3 for short-term preservation, 2.8 x 10^6 in mm^3 for freezing
- Cubic content min. 0,5 cm^3
- Activity min. 70%, pathological max. 15%
- Morphologically normal sperms 85%
- pH 6.2 – 6.9 (over 7- reduced concentration of sperms)

Short-term preservation of semen

- **Thinners for short-term preservation (during 8 - 12 hours):**
  - **Yolk-citrate thinner**
  - **Thinner by Lopyrin (Na_3PO_4, K_3PO_4, glucose, egg yolk, redestilled water)**
  - **Milk thinner (milk, yolk, glucose, K_3PO_4)**
- **Diluting straight in collector imediately after sampling, temperature of thinner the same like semen (25 - 20°C)**

Short-term preservation of semen

- **Degree of dilution: min.number of sperms in insemination dose 100-360x10^6, dilution 1:3 to 5**
- **Preservation of diluted semen:**
  - **At 15°C preserve for 5 - 6 hours**
  - **Cool down to 3 - 5°C in fridge (carefully, sensitive to cool shock), can be used by 12 (max. 24) hours for insemination**

Long-term conservation of semen

- **Activity of defrosted semen is very good x insemination ability very bad or none**
- **50% of frozen ejaculate removed because of low insemination ability**
- **Thinners: TRIS, yolk-lactose**
- **Filling into pejetes 0.25 – 0.5 cm^3**
- **Mixing with glycerine 1.5 – 2 hours**
- **One or two-degrees freezing**

Preparation of rams for covering season

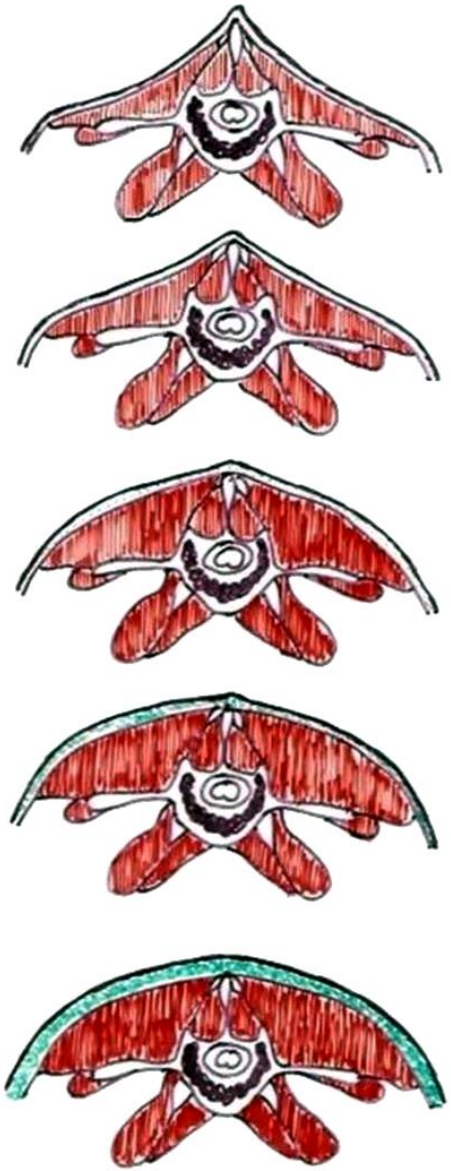
- 1 month before covering season
- Wool cutting, checking physical condition and state of health, cloven hooves treatment
- Checking the size and consistence of testicles, epididymis, ability to stick out penis and cleanness of foreskin
- Practice of samplings, increase in number of jumps up to 4 a day
- Remove of rams with breathing disorders, weak constitution and spermiogenesis disorders
- Ration - mineral substances, proteins (oats, hay, succulent forage)

Preparation of rams for covering season

- **Group stabling with a pen**
- **Assess nutritious condition (condition) – the best is degree 2.5 - 3**
- **Decide whether flushing (increased quality of nutrition) is necessary 2 - 6 weeks before covering season**
- **Fertile period after the change of the lenth of daylight**
  - **In the northern hemisphere 60-120 days after summer solstice**
  - **In our countries August- November to early spring**
  - **In the area of the equator – there is no anestral season**

Preparation of rams for covering season

- **First covering at the age of 7 - 10 months (60% of adult weight)**
- **Lenth of sexual cycle 16 - 17 days (13 - 21)**
- **„Ram effect“ : at ram´s coming to flock increasing the level of LH in plasma → speeding up of beginning of ovulation (up to 6 weeks before season), increasing of percentage of ovulation**



Schematic expression of levels of muscles at sheep between 4 – 5 – 6 lumbar vertebra

Preparation of ewes for insemination

- **Follicular phase for 2 – 3 days: growth of follicles**
- **Luteal phase for 14 – 15 days: secretion of progesteron**
- **Length of heat 1 – 1.5 day**
- **Quiet heat →looking for using ram 1 - 2x a day**
- **For 40 – 50 ewes one ram is used, fit out with a cloak or marking harness**
- **Rams require increased attention – hygiene of the cloak**

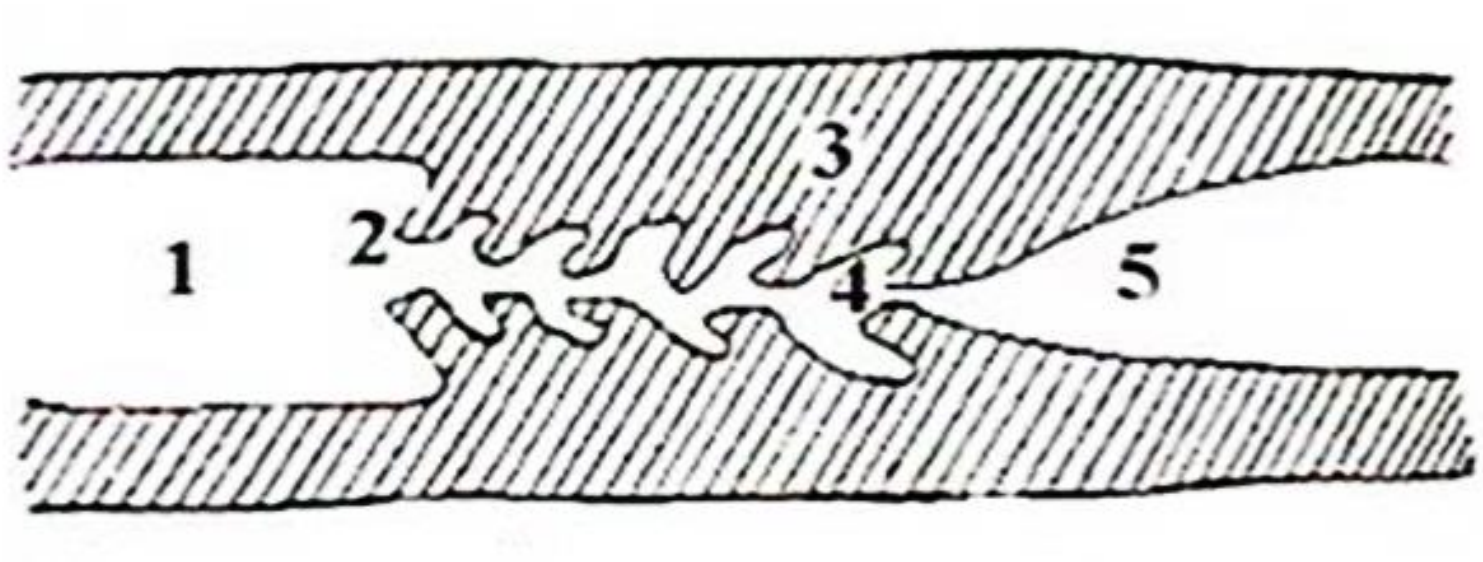
Determination of the right time for insemination

- **Time of insemination depends on the length of heat and surviving of sperms in genital traet – the best at the beginning of heat**
- **Lifetime period of eggs up to 24 hours**
- **Capacitation of sperms 4 hours**
- **Optimal time for insemination 12 – 18 (24) hours after the beginning of heat**
- **Necessary to harmonize the time of sperm sampling and the time of carrying out the insemination, sperm must be used up by 8 hours**
- **Reinsemination: 8 – 12 hours after insemination**

Methods of insemination

- **Fixation in covering, disposable pipette using vaginal mirror with light source, 0,2cm^3 of sperm**
- **After inserting the mirror checking signs of heat (mucus, opening of neck)**
- **Intravaginal method: without mirror, into upper part of vaginal vault**
- **Intracervical method: at insemination with frozen semen, 10-20mm into the duct of the womb neck**
- **Intrauterin method: on the edge of the womb, using vaginal mirror**

Shape and structrue of ewe´s cervix



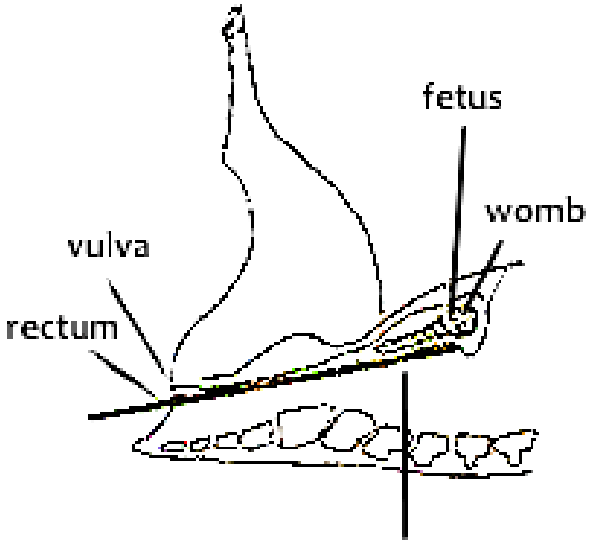
1 - vagina, 2 - ortifice of cervix, 3 - duct of cervix, 4 - cilia of cervix, 5 - womb

Diagnosis of pregnancy

- **Exact diagnosis of pregnancy = full use of reproductive capacity of ewes, provide them with good nutrition**
- **Finding out pregnancy using a ram: looks for sheep who did not become pregnant in heat**
- **Ultrasonic diagnosis of pregnancy**
- **Laboratory methods: finding out the levels of progesterone in blood**
- **Rectal palpation: position on back, PVC stick, inserting into rectum, pressure to spine, palpate womb with second hand**

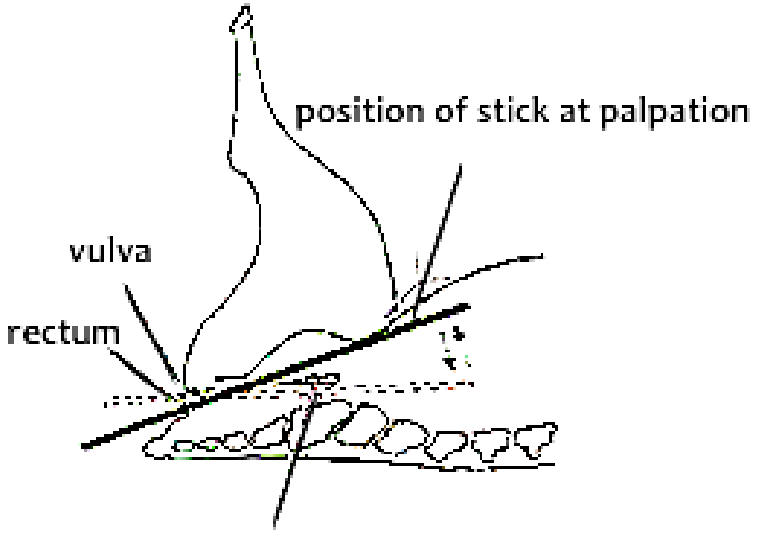
Finding out pregnancy of ewes using palpation stick, recto-abdominal method

pregnant ewe



position of stick at palpation

sterile ewe



empty womb

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