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

Artificial Insemination

Insemination of poultry

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Advantages of insemination of poultry

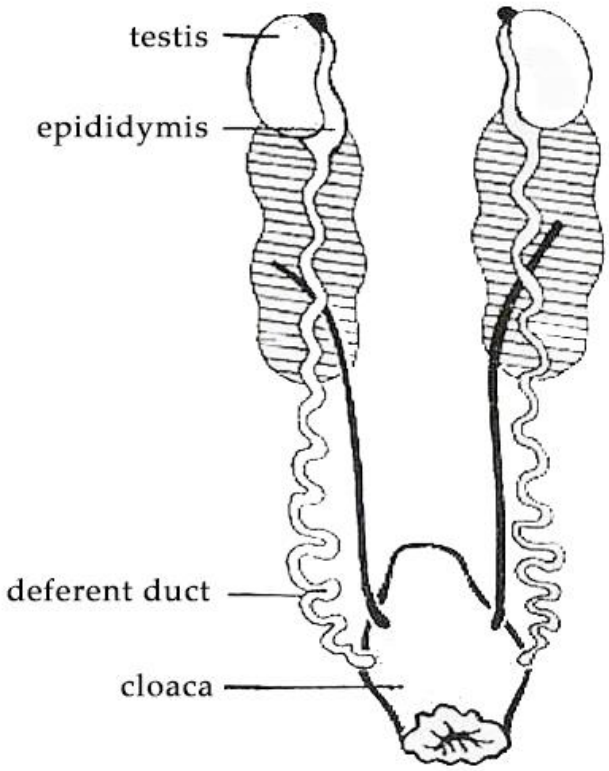
1. **Physiological = increased fertility due to insemination in regular intervals, we can get more doses from one sampling**
2. **Genetical = better use of the best males; father of the young is known; easier elimination of unsuitable males**
3. **Technological = every female is fertilized; fertilization in the same interval; males are bred separately from females (nutrition)**

Advantages of insemination of poultry

4. **Zootechnical = we can get more young animals from one mother; at hens weight increase of eggs of 1.5 – 3 g; reduced accurrence of transmitted diseases (coccidiosis)**
   - **Disadvantages: demands on quality work force, higher costs**
   - **The first insemination was carried out in 1934 in the USA at turkey hens**

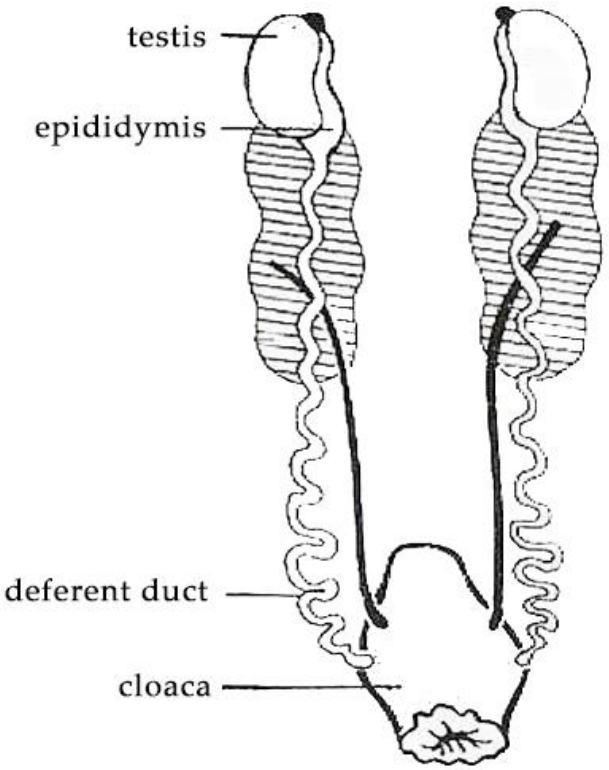
Anatomy of poultry‘s genitals - Male‘s genitals

- **Testicles are situated in abdomen cavity, left testicle is more developed, in the time of sexual activity – weight increase 200 - 300 times**
- **Temperature of testicles 3 - 4^{o}C lower (cooling with an air bag)**
- **Ductus efferens create numerous loops, they become larger towards a cloaca and they flow into the cloaca**
- **Penis is developed only at anseriform birds (drake, gender), spirally coiled, erection by squeezing of lymph**

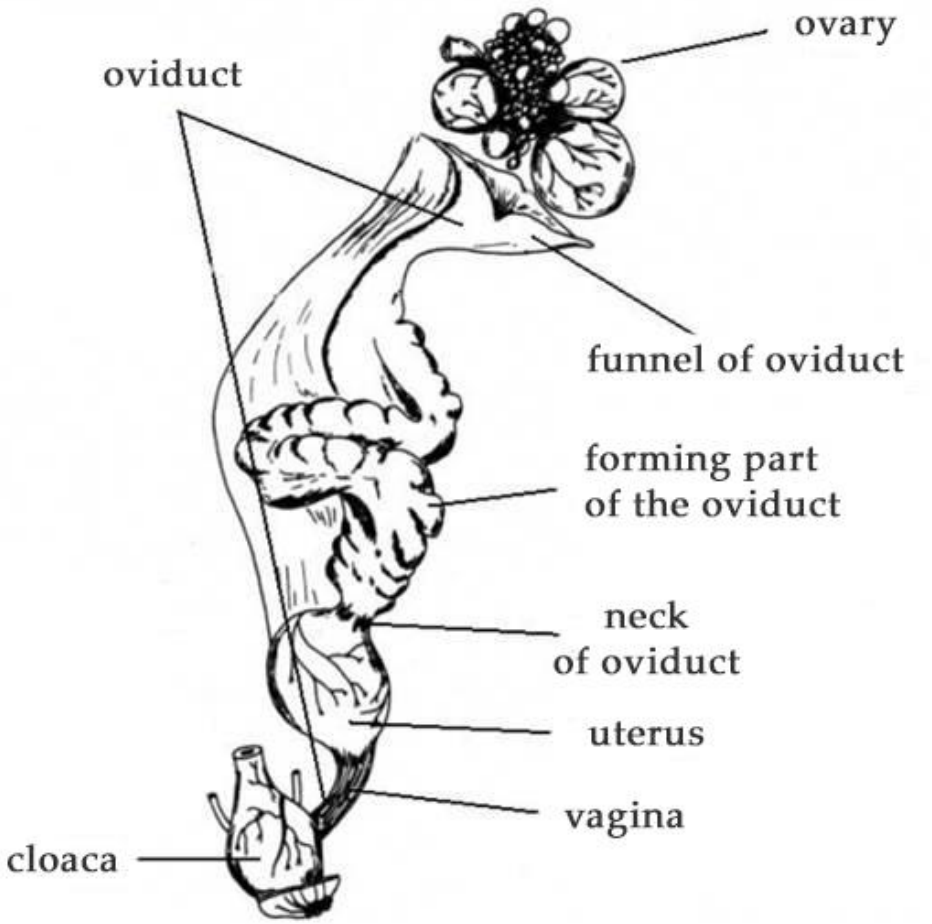


Anatomy of poultry‘s genitals - Male‘s genitals

- **Neurohumoral centre – hypothalamus → triggering hormone – control the activity of adenohypophyse**
- **Adenohypophyse: production of lutein hormone, follicle stimulating hormone**
- **Lutein hormone: it controls the production of testosterone in Leidig‘s cells**
- **Testosterone: development and function of genitals**

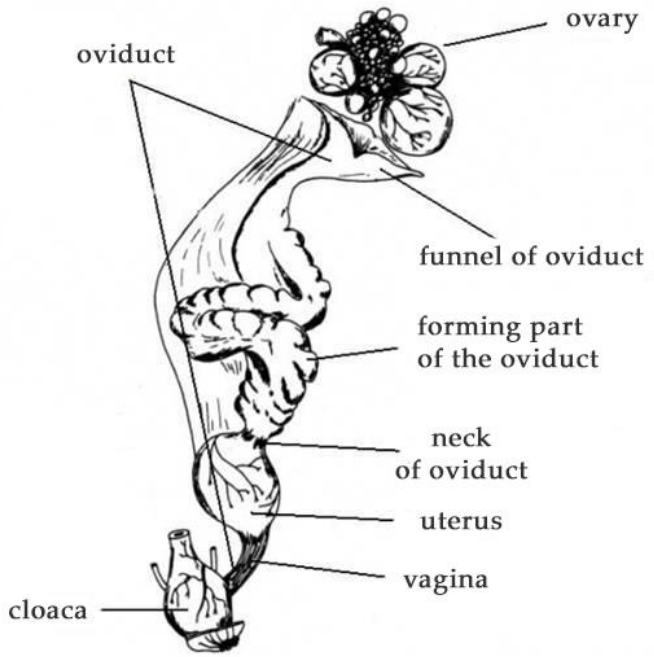


Anatomy of poultry‘s genitals - Female‘s genitals



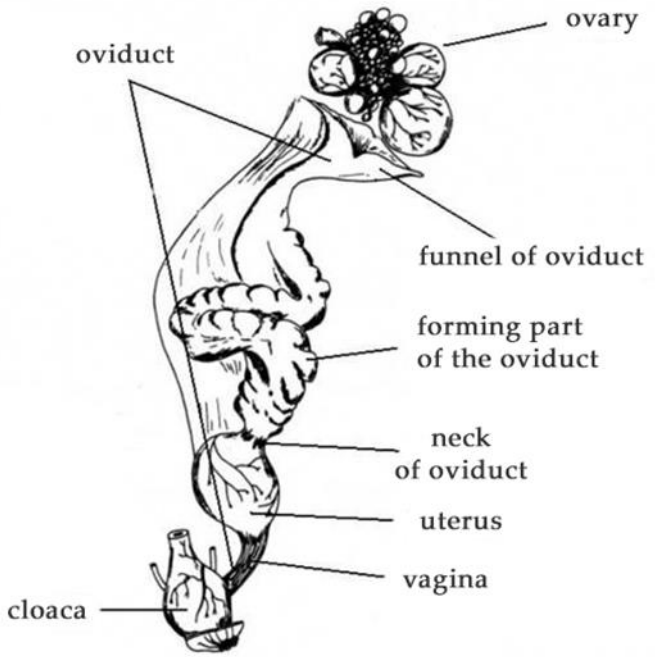
Anatomy of poultry‘s genitals - Female‘s genitals

- **Only left ovary and oviduct are developed**
- **Ovary: cluster formation increases in the time of sexual activity (from 2 - 3 g to 35 - 40g)**
- **On the ovary 3000 -7000 oocytes, an oocyte contains a nucleus, on the edge closer to the ovary there is an embryonic target, against it there is stigma (a place without blood vessels, where rupcure of follicular cover happens)**
- **Fertilization of yolk sphere in a funnel of oviduct**
- **The way of sperms into the funnel of oviduct 2 - 3 hours**



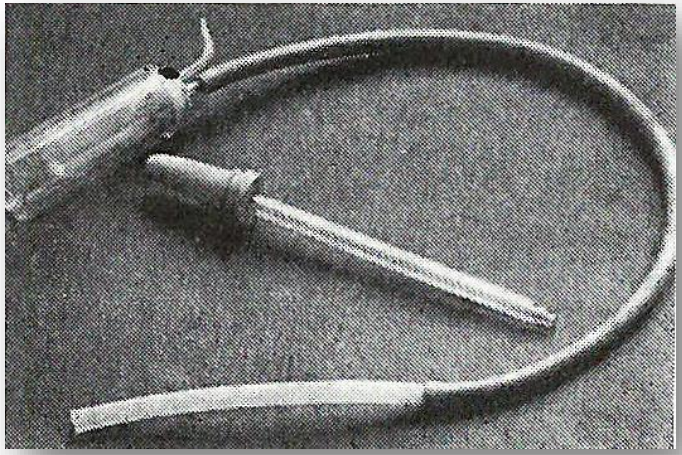
Anatomy of poultry‘s genitals - Female‘s genitals

- **Fertilization 5 - 6 hours, creation of an egg 1 day**
- **Creation of thick albumen - eggwhite – narrowing of the oviduct**
- **Creation of albumen – albumen - forming part of the oviduct**
- **Creation of under-shell membranes – the neck of oviduct**
- **Creation of an egg-shell – uterus**
- **Transition from uterus into cloaca = vagina – phlegm, which helps with an egg-laying**



Sampling of semen

- **Males are bred separately from females**
- **Practice of sampling 1 - 3 weeks using massages**
- **We assess quality and amount of sperm, which depends on nutrition, treatment and practice**
- **Tough treatment and noise affect it negatively**
- **Before the start of insemination it is recomended to have 25% reserve of breeding males**



Principles of semen sampling

Type	Age (months)	Frequency of samplings	Number of breeding females
Rooster laying type	6	3-4x a week	40-60
Rooster meat type	7	3-4x a week	40-60
Gobbler	8	3-4x a week	20-30
Drake	7	once a week	10-15
Gender	8	every 2nd day	10-15

Methods of semen sampling - Rooster

- **The method of abdominal region massage, 2 workers carry it out**
- **Steps: an assistant holds a rooster for legs, its head in his armpit, with his right hand he carries out the massage from the chest bone to a cloaca; the sampling person bends the rooster‘s tail feathers to its back, cleans the cloaca, with his right hand he squeezes the cloaca (protrusion of coupling papilla) → ejaculation**
- **1 sampling lasts about 20 sec, during 1 hour it is possible to sample up to 70 roosters**

Methods of semen sampling - Gobbler

- **The method is the same like at roosters, only bigger pressure on the cloaca during squeezing out of semen**
- **Squeeze of the cloaca max. 3x**

Methods of semen sampling - Gender

- **The method of abdominal region massage**
- **Steps: sampling on a table, the first worker fixes a head and wings, abdominal region overhangs the edge of the table, the second worker carries out the massage (back with his left hand, abdomen with right hand) towards the cloaca, after the erection of penis he increases the hand pressure on the base of penis, with left hand he massages the area of cloaca**
- **The first worker samples the ejaculate**

Methods of semen sampling - Drake

- **The method of abdominal region massage or electroejaculation**
- **Steps: sampling is the same like at genders**
- **The second way: a drake is separated from ducks for 1 day, after letting the drake in among ducks, when it is ready for mating – the massage around a cloaca, after erection of penis massage with pressure on the root of ejaculation**
- **Electroejaculation: voltage 20 V, intensity 40 – 50 mA, the first electrode on the region of cross-bone, the second inserted 4cm into the cloaca, turn on the current 3 - 5x for 4 - 6sec., take out the electrode from the cloaca, squeeze the cloaca → ejaculation**

Assessment of ejaculate

- **Colour, scent, consistency**
- **Cubic capacity, density, pH**
- **Mobility of sperms**
- **Abnormality of sperms (at birds it accurs very often): twist of head, vacuolization of head, curvature or swelling of flagella, absence of acrosome**

Quality indicators of ejaculate

Type	Cubic capacity (cm^3)	Density mil/mm^3	pH	Mobility (%)
Rooster	0.76 - 2.83	1 - 12.4	6.3 - 7.8	98 - 100
Gobbler	0.3 - 0.5	2.7 - 8.4	7 - 8.1	92
Drake	0.25 - 1.5	3.5	6.6 - 7.3	80
Gender	0.2 - 1.5	0.03 - 1.3	6.9 - 7.3	30 - 80
Guinea fowl	0.1 - 0.15	2.5	6.2 - 7.1	80

Dilution and preservation of sperm

- **Thinners(diluents):**
  - **Physiological solution of NaCl**
  - **Tyrod‘s solution, Ringer‘s solution**
  - **Citrate or phosphate diluent with eggwhite or milk**
- **Preservation of sperm:**
  - **5 hours: cooling at 15°C (gobbler)**

    cooling at 3 - 5°C (rooster)

Dilution and preservation of sperm

- **Deep freezing:**
  - **Semen from 10 roosters for 20min. into a cold room, cooling at 3 – 5°C during 5min., dilution 1:1with glycerine, equlibration for 15 min → into liquid nitrogen**
  - **Before insemination we centrifuge glycerine**
  - **Vitality of sperms 60%**

Steps of insemination - Hens

- **Once a week, always after clutch**
- **The1st worker fixes a hen and carries out the protrusion of cloaca**
- **The second one inserts cannula into the outlet of oviduct (vagina) and he puts in the semen**
- **Cannula 3 cm deep (if it was deeper - damage of the oviduct, if it was shallower - squeezing of sperm)**
- **This method is suitable at guinea hens as well**
- **Insemination of cca 500 hens during 1 hour**
- **Dilution of sperm at heavy hens 1:1, others 1:1 up to 1:10**

Steps of insemination - Turkey hens

- **Undiluted sperm by 20 minutes after sampling (1 gobbler for 10 turkey hens), hatching out 92 - 97%**
- **If the sperm is diluted - hatching out is lower**
- **Dilution at heavy turkey hens 1:1, others 1:1 to 1:10**
- **Fixation for legs, head lower than a cloaca**
- **Tail feathers up, protrusion of the cloaca, insemination using cannula into the depth of 4 – 6 cm (semi-automatic dispenser)**

Steps of insemination - Turkey hens

Steps of insemination - Geese and ducks

- **They are fixed on a stand**
- **The first worker fixes wings and a tail, the second one finds an oviduct in cloaca with his left forefinger and inserts a pipette into the depth of 4 – 6 cm**

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