[HORMONES OF REPRODUCTION]

VET Caress

[VETERINARY CARE SERVICES]
http://www.dratiqullahkhan.yolasite.com
Preface

This monograph of “Hormones of Reproduction” is compiled for the students of Veterinary Sciences to provide them efficient Knowledge of Hormones of Reproduction and their clinical uses in the field of Veterinary Reproduction.

I am well aware that some errors and inaccuracies may have found into the text and hope that the users of this document will bring these to my attention so that to make corrections in the next editions.

Thanks!

Dr Atiq Ullah Khan Sa’yem
DVM (GCVS)
RVMP (PVMC)
http://www.dratiquallahkhan.yolasite.com
dratiquallahkhan@gmail.com

First Edition 2013
Dedication

This Monograph is dedicated to my wonderful parents, who have raised me to be the person I am today.

Hi Abba and Ammi!

You have been with me every step of the way, through good times and bad. I thank you for all the unconditional love, guidance, and support that you have always given to me, helping me to succeed, and instilling in me the confidence that I am capable of doing anything I put my mind to.

Thank you for everything.

I love you!
Hormones of Reproduction

Hormone:
Hormone is a chemical substance that regulates certain activity of its target tissue (target is specific tissue which has receptors for the effect of the hormone).

Receptor:
Receptor is a special molecule present on the cell that binds with hormone to bring the required effect of the hormone.

Hormones are organic physiological substances. All reproductive processes are driven by hormones. When problem is there in the effect of hormone function then it also indicates that the problem may lie due to the number of receptors present at target site.

GnRH (Gonadotropin Releasing Hormone)
- GnRH is the mother reproductive hormone. It is a deca-peptide hormone. It is secreted from hypothalamus which is 1/300 part of the brain. It is the part of diencephalon present at the base of the brain.
- Hypothalamus has three areas: a) Preoptic nucleus, b) Suprachiasmatic nucleus (SCN), c) Anterior hypothalamic area (AHA).
- Hypothalamus is made up of neurons, secretion occur from cluster of cell bodies and gonadotrops in the pituitary are the target cells. It controls hunger, anger, emotions and sexual process and pleasure.

Factors which STIMULATE GnRH secretions
These factors can be divided into two categories, viz.: External or environmental and Internal or endogenous.

External Factors:
- Good balanced nutrition
- Viewing sexually attractive individual of opposite sex
- Weather (pleasant) especially in seasonal breeders. Long day is favourable for mare. Short day is favourable for sheep.
- Favourable, comfortable and stress free environment.

Internal Factors:
- Epinephrine & Nor-epinephrine.
- Melatonin favours the release of GnRH
- Coitus in Cat (physical stimulation to vagina)
- In cats and camels the sexual stimulation favors the release of GnRH as they are induced ovulators.
- Decrease Progesterone (P4) and increase Estrogen (E2) in acyclic females.
- Sight and Hearing of sexually attractive individuals. (especially for males)
- Pheromones favor the release of GnRH.

Factors which SUPPRESS GnRH secretions:

External Factors:
- Stress and Depression
- Starvation
- Prolonged sickness and Acute pain
Hormones of Reproduction

By Dr Atiq Ullah Khan Sa’yem

Internal Factors:

- **Prolactin** (a hormone) suppress the secretion of GnRH.
- **Opioids** i.e. β-endorphins, secreted while suckling, thus suppress the release of GnRH
- Increase **Progesterone** (P₄) will lead to low GnRH production.
- Low Estrogen (**estradiol 17β**) will lead to low production of GnRH. ** Estradiol 17β** is needed for animal to be in heat.

Clinical Uses of GnRH

Manage mental Uses of GnRH

- To enhance puberty in pre-pubertal age heifers. (To bring puberty earlier).
- To induce cyclicity in post-pubertal age heifers, if ovaries are of normal size.
- To induce cyclicity in postpartum females or early ovarian rebounce in postpartum females.
- To minimize the incidence of follicular cysts in postpartum females.
  In high yielder cows, incidence of follicular cysts is high in postpartum period; due to low LH secretion. So all postpartum females must receive single shot pf GnRH 20 days after parturition.

  ➢ Follicle on ovary ---> ↑ estrogen ---> LH will release upon GnRH stimulation.
  ➢ No follicle on ovary ----> ↓ estrogen ---> FSH will release upon GnRH stimulation
- To improve conception rate, give a single shot of GnRH at the time of AI. It will cause release of LH surge and ovulation will occur at time, so improve the conception rate. There is about 5-10 % increase in conception rate.
- To improve pregnancy rate, give a single shot of GnRH 10-12 days post-AI. It will cause release of LH which ultimately acts on luteal cells of CL in order to stimulate the activity of CL for progesterone release.
- It is used in heat synchronization regime.

Clinical Uses of GnRH

- To treat ovarian follicular cyst
- To curtail the prolonged heat period in mare. GnRH will cause release of LH, thus ovulation will occur. For this purpose, it is injected at 5th day of heat (estrus).
- To curtail the prolonged proestrous in bitch. In proestrus, bitch discharged blood out of vulva, so heat comes when blood discharge from vulva stops and female start accepting the male. Proestrus period in bitch is normally 10-12 days. In bitch, certain level of progesterone is also needed to come in heat, so inject GnRH after 10 days of proestrus, it will cause release of LH which ultimately luteinize the follicular cells and start releasing progesterone (Normally luteinization begins before ovulation in bitch).
- To treat the cases of delayed ovulation; because of property of GnRH to release bulk amount of LH hormone. Fertilization failure is because of delayed ovulation, so a single shot of GnRH at the time of AI or service will solve this problem and increase the fertilization rate.

Products of GnRH

These are categorized into two types:

i) Natural GnRH

ii) Synthetic GnRH
Natural GnRH Preparations
It is very difficult to get natural GnRH because of its so short half life. No clinical use has been reported, synthetic preparations are only available.

Synthetic GnRH Preparations

- **Gonadrolin:**
  Its structure is similar to that of natural GnRH. It is available with different trade names in the market: Cystorelin® and Factel® [50 μg/ml]

- **GnRH analogues:**
  Such preparations are: Buserilin [Receptal® 4 μg/ml by Hoest; Conceptal® 4 μg/ml by Star], Lecirelin [Dalmarel® 25 μg/ml]

Dose rate:

- **Gonadrolin:**
  Normal dose (for post AI or service, and follicular growth etc.): 250 μg/cow IM
  Dose for treatment of follicular cyst: 500 μg/ml IM

- **Buserilin:**
  Normal dose (for post AI or service and follicular growth etc.): 20 μg/cow IM
  Dose for treatment of follicular cyst: 40 μg/cow IM

- **Lecirelin:**
  Normal dose (for post AI or service and follicular growth etc.): 50 μg/cow IM
  Dose for treatment of follicular cyst: 100 μg/cow IM

Precaution:

- You must wait for 8-10 days after treatment. If no effect, then repeat it.
- You also do attention on nutrition of animal from 1 month before treatment. Protein and mineral mixtures must be provided to animal in their ration.
- Animal with poor body condition usually does not respond optimally to hormonal treatment.

Gonadotropins
These are of two types:

i) Pituitary gonadotropins: FSH & LH
ii) Placental gonadotropins: hCG & eCG

FSH, LH, eCG and hCG are gonadotropic hormones. These are members of family glycoprotein. These hormones are made up of alpha and beta carbohydrates molecule chains. These two chains are linked by covalent bonds. Alpha subunit is same in all these four hormones having 92 amino acids but beta subunit is different which is responsible for biological function. But alpha is also needed. Without a subunit the structure is incomplete and cannot perform its function.
Hormones of Reproduction

By Dr Atiq Ullah Khan Sa’yem

Page 6 of 16

Half life of Gonadotropins:
Pituitary gonadotropins: FSH: 2 hours LH: 2 hours
Placental gonadotropins: eCG: >3 days hCG: >12 hours

Comparative Features of pituitary and placental gonadotropins

<table>
<thead>
<tr>
<th>Pituitary Gonadotropins</th>
<th>Placental Gonadotropins</th>
</tr>
</thead>
<tbody>
<tr>
<td>(FSH, LH)</td>
<td>(eCG, hCG)</td>
</tr>
<tr>
<td>Less half life</td>
<td>Long half life</td>
</tr>
<tr>
<td>Costly</td>
<td>Cheap</td>
</tr>
<tr>
<td>Low CH₂O contents</td>
<td>High CH₂O contents</td>
</tr>
</tbody>
</table>

FSH:
Follicotopin
Growth of follicle from secondary to tertiary follicle
It plays major role in synthesis of estradiole
Target is ovary
Source of natural FSH is pituitary of porcine or bovine. It is also produced now a days through
genetic engineering by inserting FSH producing gene into the E.coli organism.

LH:
Final growth of follicle, ovulation, formation of CL, maintenance of CL. Target is ovary and CL. Source of natural LH is porcine or bovine pituitary.

eCG/PMSG:
Its action is like FSH in all animals except in mare where its action is LH like. It is released in mare at
40 day pregnancy by endometrial cups (specific structure formed by trophoblast cells of embryo) by
day 70 of pregnancy PMSG reaches to peak level i.e. 100 IU per ml of plasma and this peak persist
up to 3rd month. During 4th month capacity of production reduces gradually and in 5th month it
stops. No PMSG as endometrial cups are destroyed (destruction start in 4th but completed in 5th
month). Fetus is 50% foreign for mother. In uterus local immune system becomes weak that it does
not attack fetus. Pg weakens local immune system. Maternal system recognizes endometrial cups,
kill them gradually, up to 5th month all dead no PMSG.

hCG:
Acton is LH like. Embryo starts production of HCG by day 10th of pregnancy because it implements
with endometrium by that time. The outermost cells (trophoblast) start producing
hCG. At day 90 the peak production of hCG is seen. At 5th month its production decreases but low
level 22 IU per ml of plasma of hCG continues to be produced in it till end of pregnancy. It is
leuteolytic hormone. Embryo is responsible for its own life by producing the sufficient level of the
hCG.
PMSG is a bigger molecule. It can not pass through kidney so can not pass through the urine and
can not be detected. So blood is used to extract the PMSG.
hCG will pass through kidney in the urine and can be separated from urine of the pregnant human
female.
**Hormones of Reproduction**

**Clinical Use of FSH:**
- Infertility due to failure of follicular growth
- It is used for superovulation

**Dose of FSH:**
Available preparations: FSH-P®, Follitropin®
Follicular growth: 5 mg IM, 12 hourly for 2 days
For superovulation: 5 mg IM, 12 hourly for 4-5 days

**Clinical Use of PMSG:**
- Infertility due to failure of follicular growth
- It is used for superovulation

**Dose of PMSG:**
Available preparations: Gestyl ® (by Organon), Folligon ®, Fostim®
Follicular growth: 1000 IU, IM
For superovulation: 2500-3000 IU, IM once in a cow

**Clinical Use of LH:**
- For treatment of follicular cyst
- For treatment of delayed ovulation

**Dose of LH:**
Available preparation: Lutropin®
For delayed ovulation: 12.5 mg, IM
For treatment of follicular cyst: 25 mg, IM

**Clinical Use of hCG:**
- For treatment of follicular cyst
- For treatment of delayed ovulation
- Used in the Rig test

**Dose of hCG:**
Available preparations: Pregnyl® (by Organon), IVF-C® (by LG)
For delayed ovulation: 5000 IU, IV
For follicular cyst: 10,000 IU, IV

**Rig Test**

**Purpose:** To confirm the suspected cases of cryptorchidism

**Action:** hCG simulate the production of testosterone in blood
Take blood sample (Sample A) 30 min before giving the injection of hCG.
Then give a challenge dose of hCG i.e. 10,000 IU
Collect the blood sample (Sample B) again 30 min after giving the injection.
Compare the both samples (A& B) for the level of testosterone.

**Result:** High rise in testosterone level in descendant testes but no difference is seen in cryptorchidsm.
For testicular descent in pups: give a dose of 500 IU per pup, 2 times in a week for 4 week.
Hormones of Reproduction

By Dr Atiq Ullah Khan Sa’yem

Prostaglandins

It is group of hormone like substances, derived from fatty acids mainly from arachidonic acid (essential FA). Arachidonic acid is 20 C polyunsaturated fatty acids with a cyclopentane ring in its structure. There are different classes of prostaglandins depending upon its structure. Mostly fatty acids are involved in inflammatory process. They perform functions as in blood pressure, reproductive organ, respiratory system, digestive system. Prostaglandins are ubiquitous in nature (all over the body). Histamine is stored as pre form in the body but prostaglandin is synthesized when it is needed on the basis of enzyme involved.

First prostaglandin was found in human semen by Swedish physiologist Von Euler in early 1930s (1931). He wanted to know effect of semen on uterus (mice uterus was used that showed contraction by semen effect). Histamine and ACH were two substances known that caused smooth muscle contraction but human semen does not have these two. So later he found the prostate gland that causes contraction, present in the seminal plasma. In 1934 prostaglandin name was given to it. In 1959 Eliasson gave idea that prostaglandin comes from seminal vesicle not prostate gland and causes myometric contraction. Similar substance is released by many tissues. There are different types of prostaglandins as A, B, D, E, F, I. E and F are important in reproduction. In male it may help in ejaculation of semen from male duct system. During 1960s animal scientists came to know that old CL regresses before new cycle starts. In 1969, Niswander et al found that in sheep the prostaglandin of endometrial origin causes cyclic regression of the CL. In 1972, in horses same thing found to kill CL. So prostaglandin of endometrial origin is luteolytic.

Function:

- Cyclic regression of CL. Due to strong vasoconstriction blood supply is reduced to CL and physical death of CL occurs. (at 17-18 day of cycle abundant PGF2α is released and drained by uteroovarian veins, directly passes from vein to artery and regress CL without entering general circulation. When we take blood from jugular vein, it does not contain prostaglandin).
- PGE2α is luteotropic, favours the growth of CL. It is vasodilator and increases blood supply
- Helps in transmission of semen in duct system
- In male prostaglandin causes smooth muscle contraction for ejaculation of semen.
- Involved in ovulation. It is produced in follicle causing contraction of myoepithelial cells of follicular wall. (Indomethacien is substance injected into follicle, ineffective enzyme, no PGF2α and no ovulation. So PGF2α is important for ovulation). Increased the pressure of follicle fluid, thinning of wall and contraction of wall leads to rupturing of follicle. (In endometrium release of PGF2 is activated by estrogen and oxytocin).
- At the time of parturition it softens the cervix and cervix is easily is expandable.
- Involved in first phase of parturition. PGF2α produced in placentome under the effect of increased level of estrogen.
- Fetal placental expulsion is also by the role of PGF2 α. At the first stage labour it reaches its maximum concentration then its production decreases but contractions remain for placental expulsion and lochial discharge (It is blood mixed discharge from uterus that comes from 10-15 days after parturition).

Sources of PGF2α:

In female endometrium

- Fetoplacental unit during parturition
Hormones of Reproduction

By Dr Atiq Ullah Khan Sa’yem

- Myometrium (parturition)
- Grafian follicle (during ovulation)

Uses:
All its uses are based on its two primary effects/uses as the regression of CL and myomerial contraction. So uses are

- Treatment of acyclic animal due to persistent CL
- Treatment of luteal cyst
- Estrus synchronization (2 injections of PGF2 11 days apart)
- Induction of parturition. We use corticosteroids also along with it to finish all sources of progesterone.
- Termination of pathological pregnancies (as fetal mummification, fetal maceration, hydroamnios, hydroalloantois)
- Termination of unwanted pregnancies. CL remains for 5-6 days insensitive to PGF2α, so give PGF2α after 7 days of ovulation to avoid pregnancy. Response of CL to
- PGF2α is better for 10-11 days aged CL than 7-8 days aged. Because receptors are not much effective on CL. Upto 150 days alone PGF2α can be used but after that corticosteroids are also used because placenta is also the source of progesterone and both CL and placenta should be regressed.
- Prevention of pregnancy. After day 10 the superficial attachment occurs but after 22 when attachment has occurred then it is difficult to remove because now here the firm contact has been established.
- For the treatment of pyometra because CL persists in this problem; so the CL is regressed by PGF2α, cervix is relaxed and E2 is then given.
- In mild or first degree endometritis - uterus is soft, cycle is normal, history of repeat breeding; so check for small flakes, so give some PGF2α.
- In silent estrous. Estrous without behavioral signs of estrous or weak heat signs,
- In reported anestrus - animal not coming heat according to owner/failure to notice signs or male in herd is unable to detect estrus also called subestrus; give PGF2α after 3 days animal will show sign. Progesterone assay can be carried out to know the presence of functional CL. If functional CL is present, give luteolytic dose. Luteolytic dose can also be given 72 hours before insemination. Animal comes into heat 48-120 hours. More than 70% comes in 72-96 hours, 30% in 48 hours and the later in 96 hours

Brands of PGF2α:
Dinprost- is generic name of synthetic PGF2α. Luteolytic dose in cow is 25 mg in (lutalyse, 5 ml contains 25 mg). In mare 5 mg or 1 ml

PGF2α Analogues:
- Cloprostenol (500 μg IM or ½ mg or 2 ml) - estromate (ICI), cyclomate (star), prostenol (Selmor)
- Fluprostenol - equimate (1 ml, 250 μg)
- Fenprostenol
- Luprostenol
- D-clorprostenol (being dextrorotatory) - Delmazine its lutalytic dose is 150 μg or 0.15mg in cow and 75 μg in mare. (2 ml in cattle, 1 ml in mare). Mare should be administered PGF2α under supervision of doctor. Diarrhea, sweating, increased respiration may occur within 20 minutes. We can use spasmolytic in advance or after that if show any complication in mare.
Hormones of Reproduction
By Dr Atiq Ullah Khan Sa’yem

PGF2 α is strong bronchocontractor. In bitch, PGF2α is used in case of pyometra for 2-3 days. As leuteolytic it is not effective in bitch.

Estrogen
Chemically it is steroid (having 4 ringed 17 C structure). It is female sex hormone.

Cholesterol (27 C) → Progestin (P₄) (21 C) → androgens (19 C) (male sex hormone) → estrogen (18 C)

All steroid hormones are derived from the cholesterol which is a 27 C molecule. In stallion normally large amount of estrogen is secreted in urine which is converted from testosterone.
It is released by grafian follicle of ovary and cortex of adrenal gland. In some male dogs the estrogen may be produced. Here the sertoli cell tumor is the cause that results in high estrogen level and other dog will attract them. E2 is also produced in brain and adipose tissue.
In placenta more amount of E1 is produced and it goes to featus (myogenic) and help in fetal growth. When puberty is around to occur then increased reproductive tract development due to E2.
In sheep and cow specially seen that in brain there is centre on which E2 works.
Priming of progesterone before E2 work on brain is necessary for behavioral estrus. That is why silent estrus is seen first time.
E1 (estrone), E2 (estradiol), E3 (estriol), other are equilin and equilinium (in mare), most important is E2 estradiol. These are steroidal estrogens. Plants have non steroidal estrogen.

Functions:
- Androgens, if in high concentration, bring secondary sex characters prominent in the female.
- In fetus responsible for neural development which is different from male. LH surge release centre in brain is only in female and this is because of neural development difference.
- E2 is responsible for secondary sex characteristics
- E2 causes behavioral heat signs in all animals
- E2 causes release of pre ovulatory surge of LH
- E2 softens the cervix
- Prime uterus for the oxytocin and PGF2αo Brings more blood to reproductive system, increases tonicity of uterus at the time of heat. So uterus becomes more resistant to contamination or infection; leads to growth of uterus.
- Pelvic ligament dilation
- Mammary gland development
- Decrease the chances of infection
- During pregnancy, E1 (estrone) level increases, so indicate pregnancy.
- At the time of estrus it causes increase blood flow to uterine lumen, promotes the growth of endometrium, favors production of mucous through mucous glands, causes relaxation of cervix, increases water content in reproductive tract, increases tonicity of myometrium (uterine contractability increases) and increases capillary bed of uterine wall. Minute capillaries develop in proestrus and break of capillaries in estrus (some animals show post estrus bleeding).
- At the time of parturition it favours or stimulates the secretion of PGF2α, increases contractability of uterus and softening of cervix and relaxation of ligaments.
Hormones of Reproduction

By Dr Atiq Ullah Khan Sa’yem

Preparations:
E2 (estradiol) or E2-17β. It has hydroxyl group. Its forms as ester include Benzoat, valerate, cypionate, propionate, dipropionate.
E2-17β 1 mg per ml
Veterinary product is agofollin (E2 dipropionate) (1 mg/ml)
DES diethylestilbestrol (non steroid estrogen) (10 mg/ml) (I/M or Intrauterine infusions are given). It is 10 times less potent than estradiol.
E2-17β and DES are thick and oily so use needle of bigger guage.

Tablets: ethynil estradiol 50 μg, 100 μg, 1 mg
E2 is high at proestrus and beginning of heat. E2 in heat is 30 pg per ml of plasma (sufficient to cause heat).

Clinical Uses:
- Prevention of pregnancy: in cow E2-17β 4-8 mg per animal, DES 40-80 mg per animal. In cow within 24-48 hours post mating. In bitch 3-7 days post mating three injections of E2-17β 300-500 μg per animal or 10 μg per Kg. Half to one mg DES in bitch. It will slow down the movement of fertilized egg or embryo to uterus from fallopian tube by causing swelling and will not let the embryo to come into uterus at proper time. E2 is not preferred if PGF2α is available. Buffalo are more sensitive to estrogen. In buffalo it produces more side effects as low milk yield, excessive relaxation of pelvic ligament which may lead to vaginal prolapse, pronounced heat signs. There is ⅓ to ⅔ less milk. It is regained within 5-7 days.
- Termination of pregnancies: Success rate is more upto 5 month. DES 100-150 mg per cow and 5-10 days post injection abortion occurs.
- In male dogs the treatment of prostate hyperplasia. In this condition dog feels difficulty in urination. Tablets ethynil (estradiol acetate) 50 μg-1mg tablets, daily 1 mg or 100 μg is given. So dogs are hypersexual and prostate gland grows due to testosterone effect so the estradiol will block the site of the testosterone to block its effect on gland. Surgical treatment is better.
- Intra uterine infusion use in case of the pyometra. After PGF2α is used at day one. Then at day three 2-3 infusions after 48 hours (1 ml or 10 mg DES + 30-40 ml of distilled water) then give antibiotics for 5-7 days consecutively.
- Non antibiotic treatment of endometritis ½ to 1 ml infusion. But PGF2α is drug of choice
- It may help in the treatment of torsion to avoid twist in fresh cases of less degree for purpose of cervical dilation. If old case then no response because of low blood supply and tissue devitalized. After rolling open the cervix by giving estrogen. For cervical dilation 50 mg i/m after correction of torsion. After 12 hours there will be releasing.
- In heifers some times cervix is short. So difficult to give antibiotic infusion. So give infusion of 5 mg DES.
- E2 Anabolic Effect: Zeranol (capsule like) has estrogen like effect implanted in ear for 3 months in cow and steer and give weight gain effect. Zeranol is produced by a fungus.
- Ralgro (salt is zeranol) has anabolic effect in cattle, sheep, goat has 10-15% more weight gain than the untreated animals. In acute puerperal metritis (fever, off feed) estradiol is contraindicated. Because blood supply increases by giving estradiol and it causes toxin absorption through this area.
**Progesterone**

It is steroid hormone. Its main source is CL. Before puberty it comes from adrenal cortex. Its effects are seen after puberty. When animal becomes cyclic, its production starts. Just after ovulation its concentration gradually increases. In cow ovulation occurs at day two. Then becomes carpus hemorrhagic and ruptured follicle is converted into CL and complete CL after 4 days and at day 5 CL is embedded in ovarian tissue and is soft. Normally 0.2-0.5 ng/ml of plasma on heat day. At day 17-18 CL is regressing and progesterone concentration starts decreasing. Cyclic cow on day 17 has more than or equal to 5 ng/ml of plasma in cyclic cow.

PGF2α when comes then CL start decreasing abruptly. Animal having high concentration of progesterone at estrus have not good conception rate. It affects the transport of gametes. At day 5 there is more than or equal to 2 ng/ml of plasma. In cattle buffalo maximum concentration of progesterone is at day 10-12.

**Developing CL 2-5 day**

**Growing CL 6-10/11 day or young CL (2-5 ng progesterone)**

**Mature CL 10-17 day (max. progesterone >5 ng)**

**Regressing CL 17-18-21 day (decrease P₄ < 5ng)**

**Regressed CL on that day (minimum P₄ < 0.5 ng)**

**Functions:**

- Progesterone and estrogen are antagonist. They work together during gestation period.
- As the pregnancy advances for uterus growth estrogen is accelerating. Progesterone suppresses the heat. Estrogen is in higher concentration at the time of estrus,
- GnRH and causes the release of LH surge. In proestrus estrogen increasing and progesterone decreasing and it causes negative effect on GnRH.
- P₄ causes the maintenance of pregnancy, stops cyclic activity by suppressing gonadotropin release, puts negative effect on the hypothalamus and anterior pituitary and does not let the ovulation to occur. Progesterone also suppresses the heat signs.
- Progesterone released from the CL in non pregnant animals and in pregnant animals it also comes from placenta.
- P₄ suppresses the uterus contraction, so it maintains the pregnancy in contrast to estrogen that increases the uterus contraction.
- P₄ suppresses the local immune system response (suppresses infiltration).
- P₄ stimulates secretory activity of endometrium that helps in nourishment of early embryo as the fetus get nutrition from uterine milk (in form of nutrients).
- P₄ helps in closure of cervix and formation of the pregnancy seal (thick gummy mucus plug formed within the cervix).
- E2 forms the liquefied mucien form the thick mucine.
- During advancement of pregnancy estrogen and progesterone have synergistic effect as growth of uterus.
- It helps in maternal behaviour in females.

**Clinical Uses:**

- Estrus synchronization PRID, CIDR
- PRID = P₄ (1.55g) + estradiol benzoate (10 mg)
- CIDR has 1.99g P₄.
- Progesterone sponges kept in vagina, held with string outside, that act as artificial CL and keep the animal under progesterone effect and suppress the gonadotrophin release. It is kept for 14 days and then when it is removed, animal comes to heat after
Hormones of Reproduction

By Dr. Atiq Ullah Khan Sa'yem

- 1-4 days. (E2 in higher doses may act as luteolytic effect on growing CL).
- PRID also causes low conception rate as the gamete transportation is adversely affected. So decided to keep it for 9 days instead of 14 days and also give a single shot of PGF2α 24 hours before the removal of devices.
- Synthetic progesterone a norgestamate is used for estrus synchronization as ear implant or injection. It preparation is synchromat B. it has ear implant + norgestamate injection estradiol. Estradiol has luteolytic function and interferes with CL formation. It is kept for 9 days.
- Used for the suppression of heat in female animals. As in show animals 5-6 days before expected date of heat give allyltrenbolon (altrenogest, regumate) as a feed mixed progesterone source (2.2 mg/ml) and dose required in mare is 33 mg per mare per day for 15 days. 5-7 days after removal animal comes to heat.
- P₄ also used to get delay heat (means to postponed estrus). This can be used in synchronization of mare. (Rgumate contains allyltrebolone)
- In bitch and cat P₄ will interrupt the heat and postpone the heat. As the bitch enters in proestrus (bleeding starts) give the tablet (medroxy progesterone acetate salt. (Proestrus in bitch is 9-10 days). Dose rate is 10-20 mg daily for four days then give half dose (5-10 mg) for next 12 days.
- During anestrus period 5-10 mg for 40-60 days this is given. But the long term effect may cause the problem. Cystic endometrial hyperplasia will appear. This can lead to the pyometra in bitches.
- Also used as synthetic product melengestrol acetate (MGA) in feed mix for heifers (feedlot heifers) to get growth promoting effects.
- In ruminants we need N balance maintenance. In cyclic heifer it stops ovulation, the follicles will form of bigger size and release more estrogen for a longer time thus have the anabolic effect on growth.
- In human being it may act as the contraceptive

Clinical Use of Important Reproductive Hormones

**GnRH**
(For release of FSH and LH)
Buserelin @ 10-20 g IM [Dalmerilin]

**Indications:**
a) Follicular cyst
b) Acyclicity
c) Anovulation

**PMSG/eCG**
(FSH-like action)
Inj. Folligon @ 1500-3000 IU

**Indication:**
a) Superovulation in embryo transfer

**hCG/LH**
Stimulates follicular maturation and leutinization
Physex Leo @ 1500-3000 IU I/M
**Indications:**
- a) Anovulation
- b) Ovarian cysts
- c) Repeat breeder

**Oxytocin**
Oxytocin @ 10 IU I/M
**Indications:**
- a) Milk let down
- b) Myometrial contraction during parturition and post-parturition

**PGF-2α**
Luteolytic effect
Dinoprost @ 25-35 mg IM
**Indications:**
- a) Induction of parturition
- b) Induction of abortion and mummified fetus
- c) Treatment of pyometra
- d) Treatment of endometritis
Get your own copy download free from

http://www.dratiquallahkhan.yolasite.com

Or Contact
Dr Atiqullah Khan Sa’yem Marwat
dratiquallahkhan@gmail.com
03239059523

THANKS.....