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Control age of puberty

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Puberty : is the period when sexual organs are functionally developed which characterized by first ovulation.



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- ***Sexual Maturity.*** is the stage when the animal is able to express its full reproductive potential.
- The onset of puberty is the result of series of complex events that occur within the reproductive endocrine system.



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- Follicular Dynamic Wave have a great relation and changes before and after puberty
- Hormonal concentration and surge
- Pulse wave of hormones
- Development of hormonal feedback mechanism and center



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- **Factor affecting growth, puberty and sexual maturity:**
 - Species
 - Genetic
 - Nutrition
 - Growth rate and body weight(target body weight)
 - Roles of different hormones
 - Health
 - Age
 - Management condition
 - Light and photoperiod explore



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- Among all factor, body weight at early stage has important role in animal production and reproduction.



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Average Age of Puberty (Range)

Species	Male	Female
Bovine	11 mo (7-18)	11 mo (9-24)
Ovine	7 mo (6-9)	7 mo (4-14)
Porcine	7 mo (5-8)	6 mo (5-7)
Equine	14 mo (10-24)	18 mo (12-19)
Human	13 yr	12 yr



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Strategies used for reducing age of puberty:

- **1- genetic and breed selection:**
- Heifer selection should base on good health condition, structurally large body size and puberty at early age.
- Size of ovary, uterine wall, tits size and follicular diameter in female and in case of male: scrotal circumference is the important criteria for selection because its highly heritable and related to reproductive performance.



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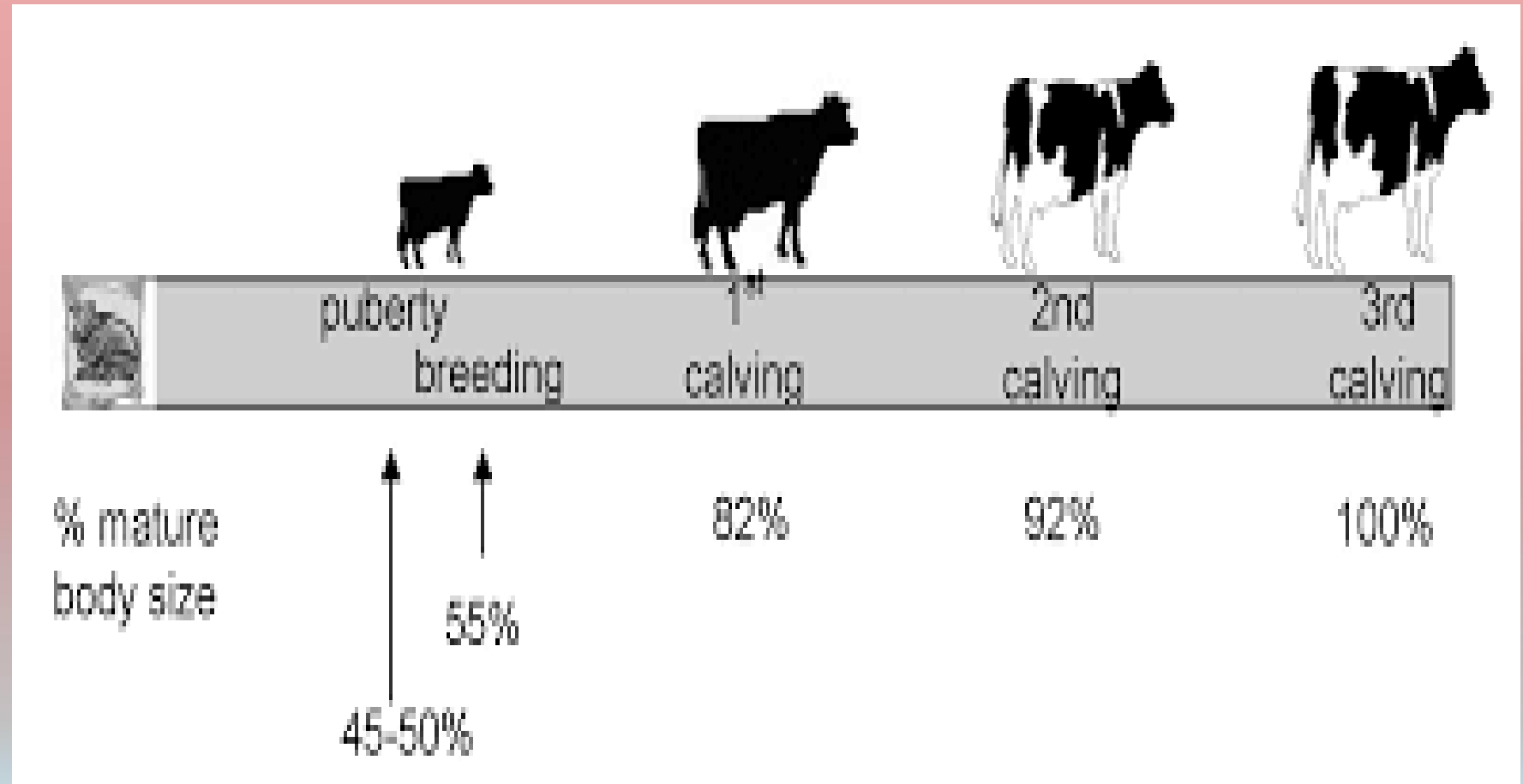
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- **2-growth and body weight selection:**
- Maturity of the heifer depends up on the body weight rather than age. Feeding high energy or high concentrate diets not only reduce the age of sexual maturity but also lowers the time period for attaining the age of first calving.
- The body weight gain may have a greater influence on onset of puberty, it was suggest that the heifer when reach 60-65% of mature body weight was good indicator for time of puberty.
- Body weight growth faster up to 3 months of age and slower from 3 to 6 month of age.
- Mammary gland parenchyma and body cells grow faster during early phase of life time than the late time of life.



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- **3- Nutritional management:**
- The onset of puberty at early stage occur due to high plan of feeding, colostrum, restricted suckling calf improve body weight in young stage.
- Protein, energy, minerals, phosphorous, calcium, lipids, and amino acid are most critical nutrition influencing the growth of calves.
- It was proposed that the period from birth to puberty in heifers can be divided into four periods, beginning with infantile period (birth to 2 months of age), developmental period (2 to 6 months of age), a static phase (6 to 10 months of age), and the peripubertal period. Nutrient intake during each of these phases (except the infantile phase) have been demonstrated to influence age at puberty.

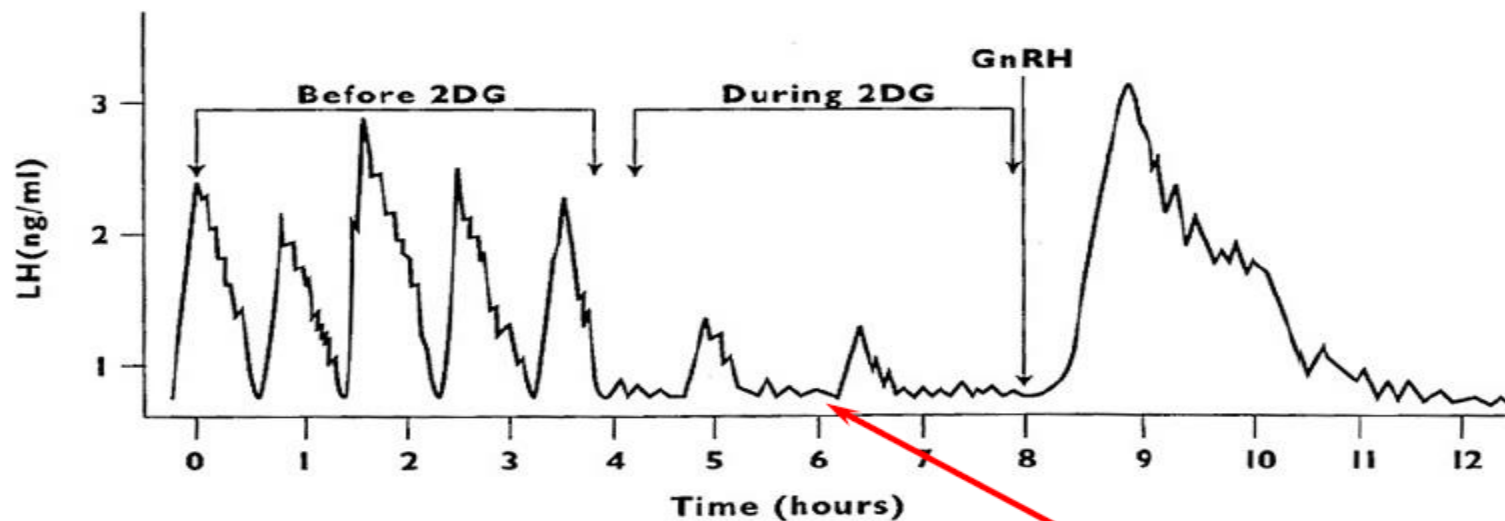


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Effect of 2-deoxyglucose on LH Pulses



Decreased Amplitude and Frequency



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- **3- hormones and factors (key factor for puberty):**
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- Rise of progesterone hormone in female and LH hormone in male is the basic evidence for puberty in juvenile animal
- The most Hormones which used to reduce age of puberty were:



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- **GnRH, estrogen, eCG, PMSG, and other Gonadotropin hormones** due to its role for activity of hypothalamus- pituitary- gonadal axis.
- **Thyroid hormones**: have a great role in the metabolism and cell growth in the body.
- **Leptin and growth hormone**: leptin hormone which secreted from adipose cell is triggering the beginning the puberty, but many research suggest that leptin accelerate puberty but accelerate body cell growth.
- **Progesterone**: used in estrus synchronization programs to reduce age of puberty in all form types(feeding, CIDR, PRID, Sponge).
- **Melatonin**: used to control puberty and photoperiod activity in seasonal animal.



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- The most Factors which used to reduce age of puberty were:
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- Plasma insulin like Growth factors (IGF-1) has important role in regulation of cell growth, cell differentiation, cell function and immune function and growth in cattle
- Kisspeptin: recently found that KP is the triggering the onset of reproductive activity in the animal.



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- **4- photoperiod and climate effect:**
- Long day photoperiod hasten puberty and accelerate lean growth in dairy heifer because effecting and role of melatonin hormone in these types of animal. A positive relationship was observed between season and onset of puberty was suggestion.



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- **5-biostimulation or male effect:**
- These effect provoked puberty by presence of male which induce estrus and ovulation through genital stimulation, pheromones and presence of vactomized bull has been reported to hasten the onset of puberty in heifers



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