PARTURITION

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TERMINOLOGY

- **Parturition** - the physiologic process by which the pregnant uterus delivers the fetus and placenta from the maternal organism.

- **Eutocia** – safe, easy, natural or physiological parturition which is completed spontaneously without any complications that might affect the health, viability and productivity of dam and its offspring.

- **Dystocia** – difficulty in birth especially when the 1st or 2nd stages of parturition gets prolonged, becomes difficult/impossible for the dam to deliver without artificial interference.

Terminologies referred to act of parturition in farm and pet animals	
Cow	Calving
Mare	Foaling
Ewe	Lambing
Doe	Kidding
Sow	Farrowing
Bitch	Whelping
Queen (Cat)	Kittening

Signs of Approaching parturition

- Changes in pelvic ligaments, enlargement of the vulva and mammary activity.
- Enlargement of mammary glands occurs in all farm species.
- Teats become swollen and secretions ooze out of orifice.
- Waxing of teats (6-48 hrs before foaling) – in mares
- Nest building - in polytocous species such as pig, dog, cat.
- Seeking isolation – in cattle, buffalo.

Initiation of parturition

- Fetus triggers the onset of parturition.
- Fetal hypothalamo-pituitary-adrenal axis is obligatory for the initiation of parturition.
- Fetal anterior pituitary —stress→ Adrenal corticotropin (ACTH)

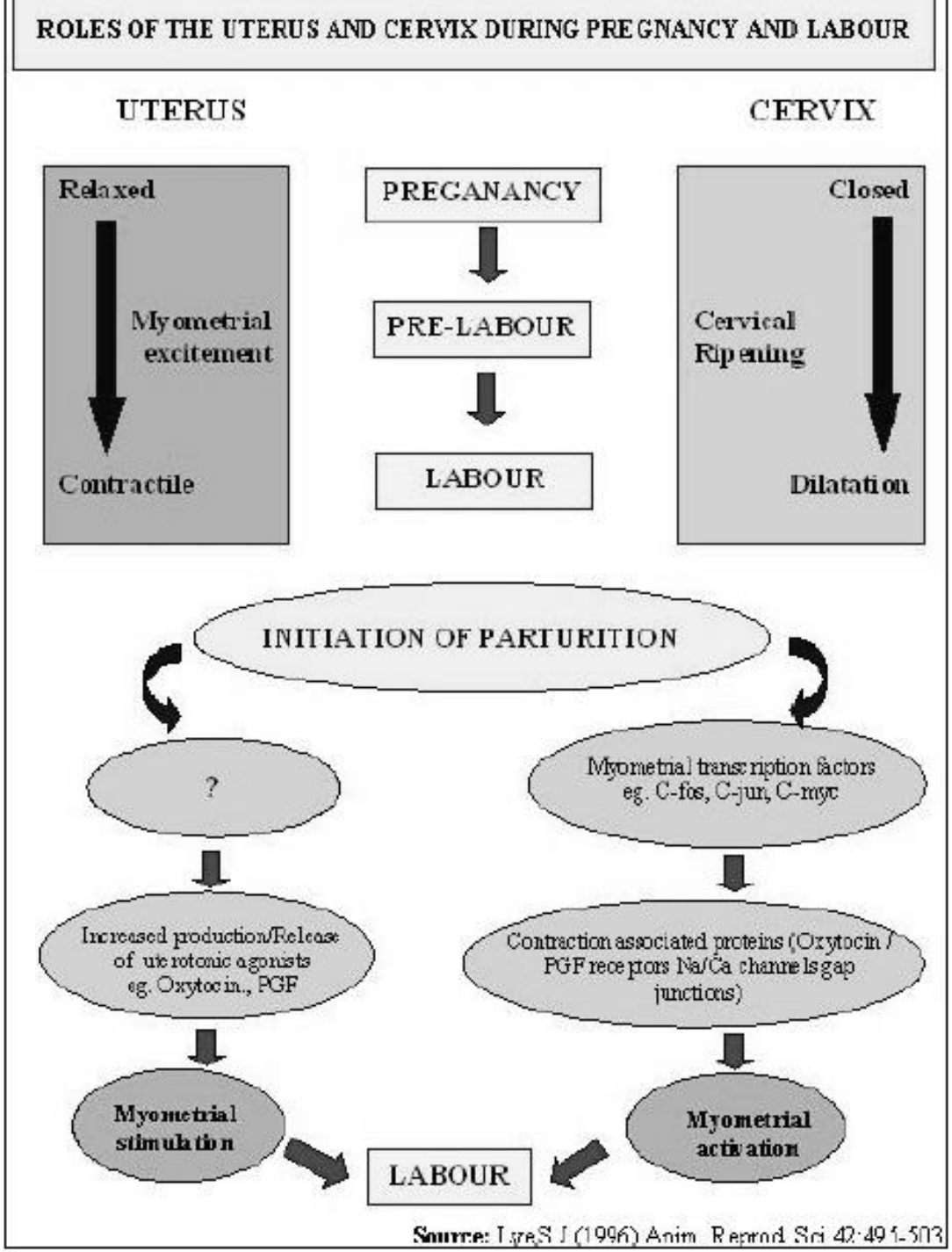
Possible factors responsible for initiation of parturition

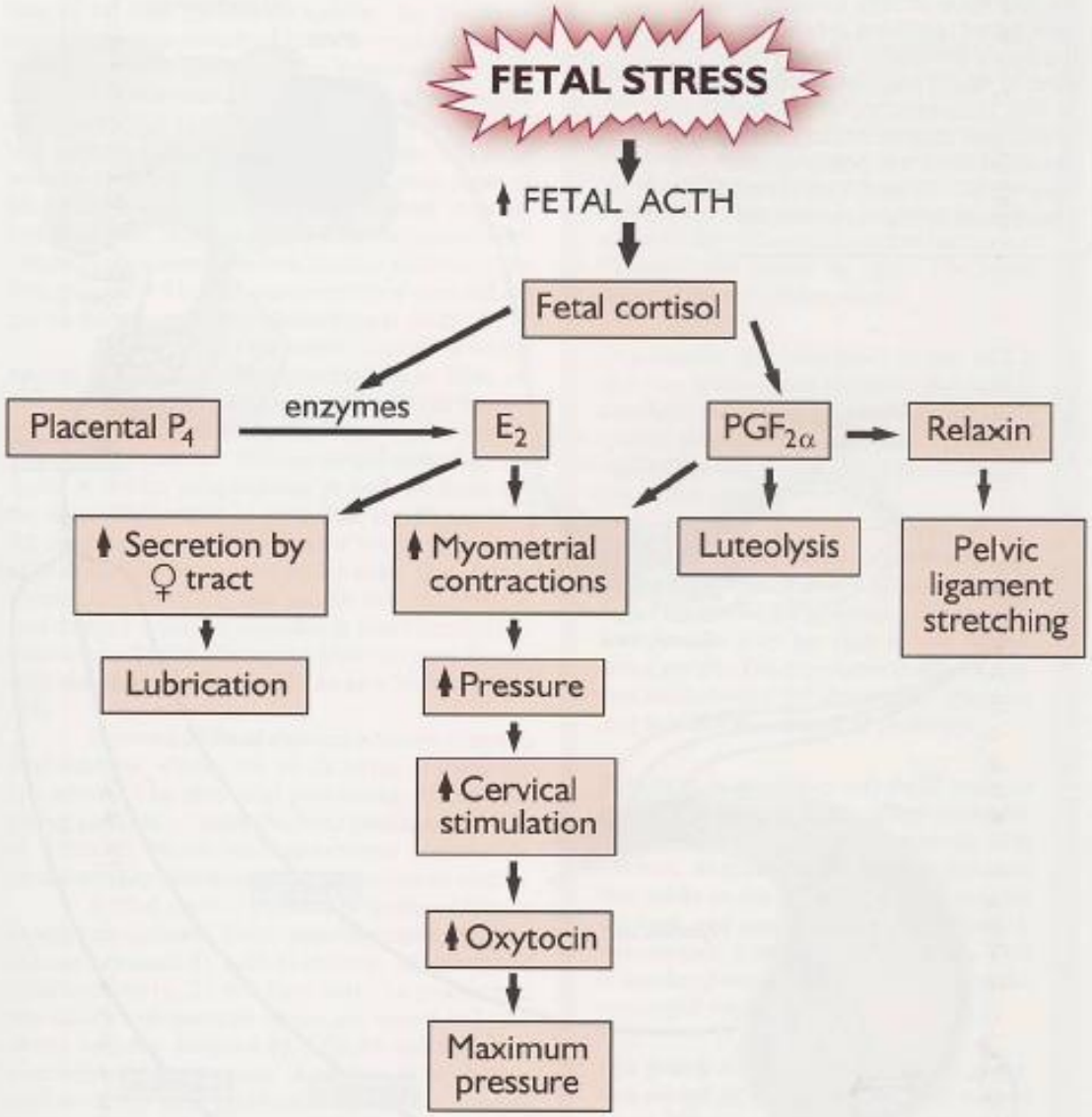
	Probable factors	Effect
Physical factors	1. Increase in fetal size	Increase in uterine irritability
	2. Uterine distension	Reversal of progesterone block Reflex to reduce size by fetal expulsion
	3. Fatty degeneration of placenta & presence of infarcts	Leads to interference in fetal nutrition & separation process of fetus from uterus
Biochemical factors	1. Increase in CO_2 tension in maternal blood due to increased fetal activity	Increase uterine contractility
	2. Release of fetal antigens serotonin	Release of collagenase and stoppage of blood supply to cotyledons
Neuro-endocrine factors	FETAL	
	1. Increase in cortisol in adrenals	Convert P_4 to E_2 & release of PG
	2. Increase in ACTH by pituitary	Stimulate cortisol release
	3. Increase in corticotrophin releasing hormone (CRH) in hypothalamus	Stimulate ACTH
	4. Increase in endogenous opiods	
	MATERNAL	Stimulate ACTH secretion
	1. Reversal of progesterone block	
	2. Release of Relaxin	
	3. Placental estrogens rise	Myometrial contractility
	4. cytokines	Dilation of birth canal Release of PG In contractility
	5. Release of PG	Dilation of pubic symphysis and sacro-sciatic ligaments Softening of cervix, Stimulate smooth muscle contractility
	6. Release of oxytocin	Myometrial contractions

- Endocrine changes cause two major events to occur:

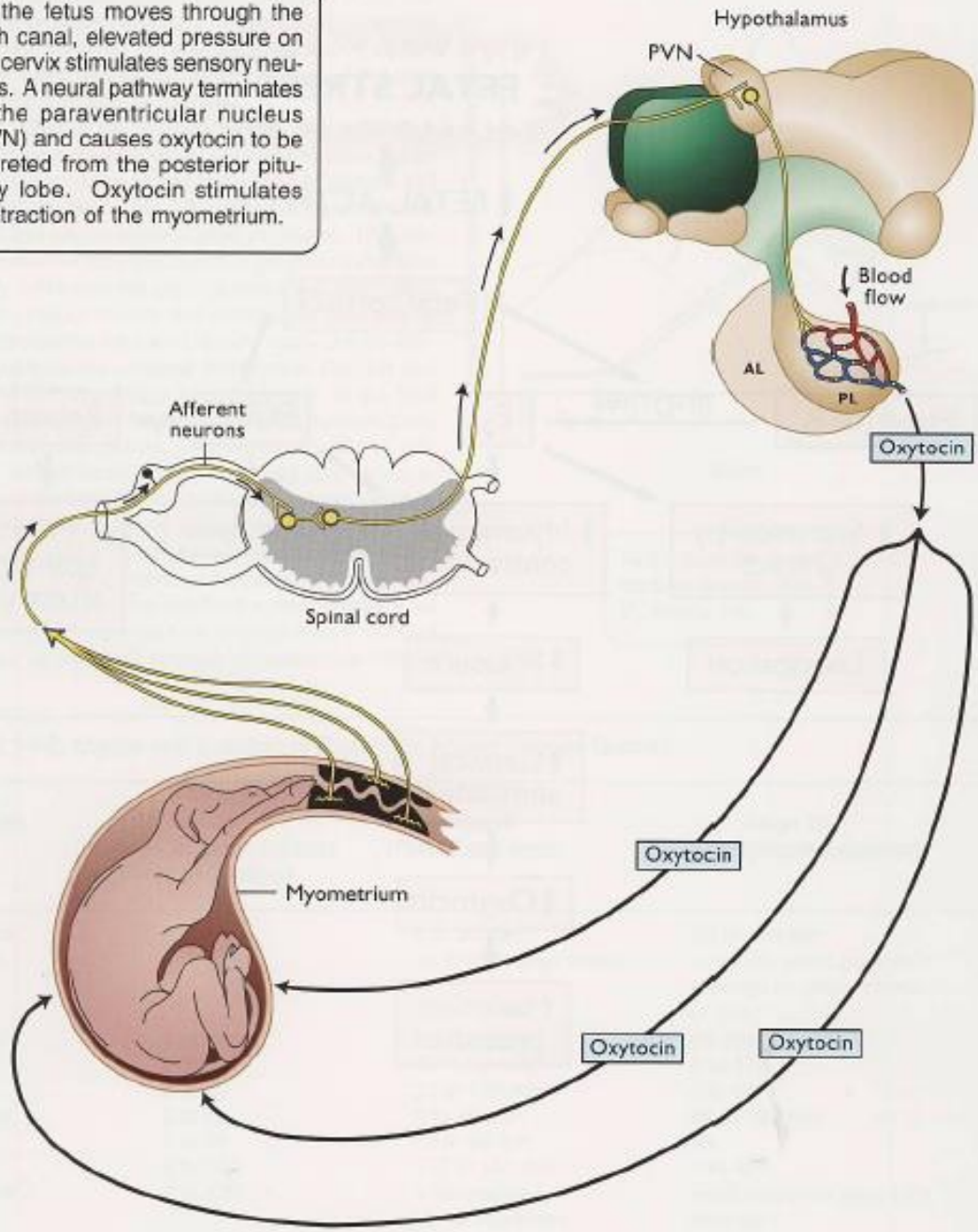
1. Removal of the myometrial “progesterone block” enabling myometrial contractions to begin.

2. Increased reproductive tract secretions, particularly by the cervix.


ROLES OF THE UTERUS AND CERVIX DURING PREGNANCY AND LABOUR
UTERUS
CERVIX
Relaxed
Myometrial excitement
Contractile
PREGANANCY
PRE-LABOUR
LABOUR
Closed
Cervical Ripening
Dilatation
INITIATION OF PARTURITION
?
Myometrial transcription factors eg. C-fos, C-jun, C-myc
Increased production/Release of uterotonic agonists eg. Oxytocin., PGF
Contraction associated proteins (Oxytocin / PGF receptors Na/Ca channels gap junctions)
Myometrial stimulation
Myometrial activation
LABOUR
Source: Lye S J (1996) Anim. Reprod. Sci 42:491-503


FETAL STRESS
↑ FETAL ACTH
Fetal cortisol
Placental P_4
enzymes
E_2
$PGF_{2\alpha}$
Relaxin
↑ Secretion by ♀ tract
↑ Myometrial contractions
Luteolysis
Pelvic ligament stretching
Lubrication
↑ Pressure
↑ Cervical stimulation
↑ Oxytocin
Maximum pressure

As the fetus moves through the birth canal, elevated pressure on the cervix stimulates sensory neurons. A neural pathway terminates in the paraventricular nucleus (PVN) and causes oxytocin to be secreted from the posterior pituitary lobe. Oxytocin stimulates contraction of the myometrium.



Stages of labour

1. Dilatation of the cervix
2. Expulsion of the fetus
3. Expulsion of the fetal membranes

Stage of labour	Mechanical forces	Period	Related factors
I Dilation of cervix	Regular uterine contractions	Beginning of uterine contractions until cervix is fully dilated and continuous with vagina	1. Maternal restlessness, elevated pulse and respiratory rates 2. Change in fetal position and posture
II Expulsion of fetus	Strong uterine and abdominal contractions	From complete cervical dilation to end of delivery of fetus	1. Maternal recumbency and straining 2. Rupture of allantochorion and escape of fluid from vulva 3. Appearance of amnion (water bag) at vulva 4. Rupture of amnion and delivery of fetus

Stage of labour	Mechanical forces	Period	Related factors
III Expulsion of fetal membranes	Uterine contractions decrease in amplitude	Following delivery of fetus to expulsion of fetal membranes	1. Maternal straining ceases 2. Loosening of chorionic villi from maternal crypts 3. Inversion of chorioallantois 4. Straining and expulsion of fetal membranes

- The following table summarizes the normal time taken to progress through the stages of parturition in different species.

Species	Mare	Cow	Ewe	Sow	Bitch
Stage 1: Contractions and Cervical Dilation	1-4 hours	2-6 hours	2-6 hours	2-12 hours	6-12 hours
Stage 2: Foetal Expulsion	12-30 minutes	30 minutes - 4 hours	30-120 minutes	150-180 minutes	6 hours (up to 24 hours with large litters)
Stage 3: Placental Expulsion	1 hour	6-12 hours	5-8 hours	1-4 hours	Placenta Exits with Foetus

Thank you