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**CYCLIC CHANGES IN THE CERVIX**

Thirty parous ewes are divided into six groups on day 0 (first day of estrus), 1, 2, 10, 15, or 16 of the estrous cycle. Observation of the tissues reveals that the surface of the cervix is highly convoluted, which results in the formation of numerous folds or crypts. Two forms of columnar epithelial cells, a ciliated and a non-ciliated cell with microvilli, line the luminal surface cervix in the 10, luteal-phase ewes. However, on day 15, 2 days before estrus, the non-ciliated cells differentiate into two morphologically distinct types of secretory cells. One type forms when the apex of the non-ciliated cell dilates outward into the lumen of the cervix. Concurrent with apical enlargement, the microvilli are lost and the limiting cell membrane becomes smooth. The other type of cell is characterized by only a slight apical swelling. Consequently, remnants of microvilli along with secretory granules can be observed on the limiting membrane of this cell. Both cells release a particulate component, which is believed to be a precursor of mucus, into the lumen of the cervix. These particles undergo a series of morphological transformations to form a fibriller layer, generally referred to a cervical mucus, that covers the epithelial surface at estrus. One to two days following the onset of the estrus, the fibers become more closely associated with amorphous material that begins to coagulate, thereby revealing the underlying ciliated and non-ciliated cells that characterize the cervix of luteal-phage ewe.

**CYCLIC CHANGES IN THE BREAST**

Each month, women go through changes in the hormones that make up the normal menstrual cycle. The hormone estrogen is produced by the ovaries in the first half of the menstrual cycle. It stimulates the growth of the milk ducts in the breasts. The increasing level of estrogen leads to ovulation halfway through the cycle. Next, the hormone progesterone takes over in the second half of the cycle. It stimulates the formation of the milk glands. These hormones are responsible for the cyclical changes women feel in their breasts just before menstruation. These includes; swelling, pain and soreness.

During menstruation, many women also have changes in breast texture. Their breasts may feel very lumpy. This is because the glands in the breasts are enlarging to get ready for a possible pregnancy. If pregnancy does not occur, the breasts go back to its normal size. Once menstruation starts, the cycle begins again.

**HORMONAL REGULATION OF THE MENSTRUAL CYCLE**

The menstrual cycle is regulated by hormones; Luteinizing and follicle-stimulating hormones which are produced by pituitary gland, promote ovulation and stimulate the ovaries to produce estrogen and progesterone. Estrogen and progesterone stimulate the uterus and breasts to prepare for possible fertilization.

The menstrual cycle has three phases;

* Follicular (before release of the egg)
* Ovulatory(egg release)
* Luteal(after egg release)

The menstrual cycle begins with menstrual bleeding (menstruation), which marks the first day of the follicular phase.

**When the follicular phase begins**: Levels of estrogen and progesterone are low. As a result, the top layers of the thickened lining of the uterus (endometrium) break down and are shed, and menstrual bleeding occurs. About this time, the FSH level increase slightly, stimulating the development of several follicles in the ovaries. Each follicle contains an egg. Later in this phase, as the FSH level decreases, only one follicle continues to develop. This follicle produces estrogen.

**The ovulatory phase** begins with a surge in LH and FSH levels. LH stimulates egg release (ovulation),which usually occurs 16-32 hours after surge begins. The estrogen level decreases during the surge, and the progesterone level starts to increase.

**During the luteal phase**, LH and FSH levels decrease. The ruptured follicle closes after releasing the egg and forms a corpus luteum, which produces progesterone. During most of this phase, the estrogen level is high. Progesterone and estrogen cause the lining of the uterus to thicken more, to prepare for possible fertilization.

If the egg is not fertilized, the corpus luteum degenerates and no longer produces progesterone, the estrogen level decreases, the top layer of the lining breaks down and are shed, and menstrual bleeding occurs (the start of a new menstrual cycle).

If the egg is fertilized, the corpus luteum continues to function during early pregnancy. It helps maintain the pregnancy.