

Case #2

Bartolin's Gland (Major vestibular gland): normal and pathological standard in veal calves (pre-pubertal) following the administration of sex hormones

NORMAL

Compound tubulo-alveolar gland, mucus producing, and embedded within the constrictor muscle of the vestibulum.

Has three main components:

- The functional parenchyma is made up of adenomers with large columnar secreting cells in cycling adult females and cubic in pre-pubertal animals;
- The myo-connective stromal tissue: supporting tissue containing the hemolymphatic vasal system which divides the parenchyma into lobules;
- The epithelium of the excretory ducts: single layer in the intralobular ducts, multilayered in intermediate ducts, and similar to the vaginal epithelium in the main duct. The height and number of the cell layers varies in accordance with the hormonal stimulation (from 10 to 50 cells layers), being minimal with the presence of a pregnant *corpus luteum* and maximal in the estrogenic cyclic phase. Obviously hormonal stimulation is not contemplated in pre-pubertal animals.

In the alveoli and ducts of pre-pubertal calves there's little or no mucous.

Sampling the Bartholin's gland: the gland is located on the external lateral wall of the vaginal vestibulum, partially covered by the constrictor muscle of the vestibulum, and can be sampled directly from outside the vestibulum.

PATHOLOGICAL

Macro: after treatment with sex hormones, the gland may increase in size and consistency.

Micro: hyperplasia and squamous metaplasia (oestrogens) of the glandular and tubular epithelium, sometimes associated with hypersecretion (androgens). A decreased amount of secretory tissue, increased number of tubules, hypertrophy of the fibro-muscular cells is also a common feature. The epithelium of the excretory ducts is considerably thickened and the cytoplasm of the cells of the surface layers is expanded and increased in size, while the nucleus is pycnotic. Pronounced ectasia, cysts formation and intraepithelial cysts in the excretory ducts are the consequences of hypersecretion.

The immunostain for cytocheratin is clearly positive in the metaplastic epithelium both in the ducts system and alveoli.

Mammary gland, normal and pathological standard in veal calves (pre-pubertal) following the administration of sex hormones

NORMAL

Compound tubuloalveolar gland. Inactive in calves, shows branched excretory ducts, lined with pseudostratified epithelium, surrounded by loose collagenous and adipose tissue. There are no recognizable secreting alveoli.

Sample: in calves the parenchyma is restricted to just a few cm of tissue at the base of the teats. It is pale pink in colour and a cube measuring 1x1x1cm must be taken.

PATHOLOGICAL

Macro: in animals treated with estrogens/progesterone the udder is increased in volume and the teats may be elongated and release secretions.

Micro: looks like a lactating gland, more or less pronounced presence of differentiated secretory glandular tissue around the ducts and in the spaces formerly occupied by fatty tissue. The differentiated tissue is made up of glandular alveoli filled with secretion.

CASES SENT FOR THE SESSION

1268/01 -----> veal calf, Bartholin's gland with metaplasia and active mammary gland (HE);

1268/01 cit. -----> veal calf, Bartholin's gland with metaplasia (immuno-stain for cytokeratin);

527/01 -----> veal calf, Bartholin's gland: control (HE);

1168/01 -----> veal calf, inactive mammary gland: control (HE);

1168/01 cit -----> veal calf, Bartholin's gland control (immuno-stain for cytokeratin);

Bibliography

1) Groot MJ, den Hartog JM. - Histological changes in the genital tract of female veal calves implanted with naturally occurring anabolic steroids. J. Vet. Med. A. **37**, 775-786 (1990)

State Institute for Quality Control of Agricultural Products, Wageningen, The Netherlands.

The influence of implants composed of estradiol and testosterone on the genital tract of female veal calves was studied. Striking results were the metaplastic and hyperplastic lesions seen in Bartholin's glands (an estrogenic effect) and a preputial-like separation of the clitoral epithelium (an androgenic effect). Other changes were less pronounced or resembled those found in estrous animals. Similar though less distinct histological changes were observed in the genital tract of animals from a farm with a history of illegal administration of anabolic steroids suggesting illegal treatment. From these findings it is concluded that histological screening of Bartholin's glands for estrogenic

influences and of the clitoris for androgenic activity can be useful in tracing illegal anabolic treatment of female veal calves with combination preparations.

2) Groot MJ, Frijns LM, den Hartog JM. - Histologic hormone studies, a practical evaluation, *Tijdschr Diergeneeskd.* 1989 Mar 15;114(6):315-21.

Erratum in:

Tijdschr Diergeneeskd 1989 Apr 15;114(8):460.

Rijks Kwaliteits-instituut voor Land- en Tuinbouwprodukten, Wageningen.

Based on histological studies of the prostate or Bartholin's gland, chemical analysis of the urine, injection site or implant was conducted in 114 veal calves suspected of receiving hormonal treatment. In 65% of the samples the results of chemical analysis confirmed the histological findings.

3) Gropp J, Boehncke E, Schulz V, von Sandersleben J, Geisel O, Hanichen T. - Effect of 17 beta-estradiol and trenbolone acetate in different doses on various physiological and morphological parameters (provocation trial). *Fortschr Tierphysiol Tierernahr.* 1976;(6):33-52.

4) Biolatti B., Bollo E., Appino S. - Genital, respiratory, mammary and thymus lesions in veal calves experimentally treated with clenbuterol and sexualsteroids). *Argomenti di Patologia Veterinaria*(Scritti in memoria del Prof. L. Leinati), 285-302, 1993.

5) Ball S, Polson K, Emeny J, Eyestone W, Akers RM.: Induced lactation in prepubertal Holstein heifers. *J Dairy Sci.* 2000 Nov;83(11):2459-63.

PPL Therapeutics Inc., Virginia Tech Corporate Research Center, Blacksburg 24061, USA.

Lactation was hormonally induced in six prepubertal Holstein heifers by seven daily injections of estrogen and progesterone and three injections of dexamethasone on d 18, 19, and 20, followed by twice daily hand milking beginning on d 21. Heifers were about 6 mo old and weighed 162 kg at the beginning of the experiment. Secretions were obtained from five of six of heifers, and twice daily milking continued for 75 d in three of five heifers. The volume of milk obtained on d 7 ranged from 32 to 500 ml and averaged 4.7, 4.1, and 3.7% lactose, protein, and fat, respectively. In the first natural lactation, milk yield and composition were nearly identical for controls and induced heifers. Serum alpha-lactalbumin was increased in induced heifers after treatment with dexamethasone and was highest on d 10 after onset of milking. Our data suggest that sufficient secretions for extensive biochemical testing can be obtained following hormonal induction of lactation in a majority of prepubertal heifers. Moreover, hormonal induction of lactation had no apparent effect on reproduction or first natural lactation. While it is unlikely that hormonal induction of lactation in prepubertal heifers is practical from a dairy production viewpoint, the advent of biotechnology for production of therapeutic recombinant proteins in the mammary gland of transgenic livestock has made early detection of these transgenic proteins very desirable. We conclude that induction of lactation in prepubertal heifers is a viable technique for testing the expression of mammary-linked gene constructs in transgenic cattle.