

Some Special Problems in Dry Cow Mastitis

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Dry cow mastitis resulting from either residual lactation infections or dry cow trauma or infection may cause an assortment of problems to the individual cow. These problems include milk stones or lactoliths, partial or complete obstruction of the gland or teat cisterns, and development of cysts in the mammary tissue. Although not limited to the dry period, traumatic injury resulting in massive hematomas seems to occur more frequently pre-partum. The purpose of this paper is to discuss the etiology, significance, prevention, and possible therapy.

Milk Stones

Milk stones are greyish red, firm, oval masses about 5 mm in diameter composed of organic and inorganic matter. These are formed in the duct system during pre-lactation, become dislodged and move to the teat at the onset of lactation, where they can be palpated. Their effect is to become a valve-like obstruction at the entrance to the streak canal preventing milk removal. Usually one or two stones are found in an affected quarter but as high as 25 to 30 per quarter have been reported.

The etiology is considered to be the presence of an irritant in the duct system during the dry period. The result of the irritating agent, either micro-organism or residual fluids, is desquamation of epithelium, forming a nucleus for organic and inorganic matter. The hardness depends upon the content of inorganic salts and the size of the area in which it is formed. Most are somewhat flexible. Milk stones have resulted from infections present at drying-off, infusion of irritating solutions at the time of drying-off or during the dry period, and new infections during the dry period.

The significance of the presence of milk stones is to indicate an etiological agent to be corrected or avoided, to require a varying degree of therapy for removal, and to lead to potential serious damage if the machine is applied to the quarter by an unobservant operator.

Removal of the stone or stones may be accomplished by forceful hand stripping or surgical enlargement of the teat orifice and hand stripping. Enlargement of the teat opening can be accomplished by incising with a Lichty's teat knife or simply dilating the opening with small forceps. In some cases, it may be necessary to grasp and crush the stone with forceps to reduce its size or grasp it with alligator forceps and remove it. The usual precautions to maintain asepsis must be observed.

Preventive measures include the following: (1) Quarters known to be infected at drying-off should be treated until cleared; (2) Dry cow infusion therapy

should contain no irritating substance; and (3) Prevention of new infections during the dry period.

Obstructions

Regardless of what else one might say about the tissue in the bovine mammary gland, one could say with certainty it is responsive to irritation. This is particularly true of the epithelium lining the teat and duct system. Tissue proliferating in response to an irritant may form obstructions ranging from polyp-like masses in the teat cisterns (spiders) to masses completely occluding the teat and gland cistern. Small pedunculated growths attached midway on the teat cistern wall may have little or no effect on milk removal. Larger masses or those attached near to the teat opening may become a valve preventing the flow of milk. This type may be differentiated from a movable milk stone and diagnosed by palpation.

Other types form a partial or complete membranous partition preventing milk from reaching the streak canal. This probably starts as developmental anomaly. It is diagnosed by finding the teat cistern distended with milk above the obstruction and empty below it. Still others, which combine both epithelium and connective tissue, fill the teat cistern, gland cistern or both. Palpation discloses the teat lumen or gland cistern replaced with solid tissue. Probing with a cannula may disclose a teat lumen 1 or 2 mm in diameter for a variable distance and then complete obstruction. Or if only the teat cistern is involved, the cannula may reach into milk in the gland cistern.

The proliferation of tissue to obstruct flow of milk from the duct system is usually the result of response to infections present during a nonlactating stage. It occurs in heifers when the gland is traumatized and infected during early development and discovered as a "blind" quarter when freshening. Calves nursing each other may cause this. It occurs in cows dried-off with an infection remaining. It may occur as a result of continuous traumatizing of the teat and annular folds at the base of the teat by overmilking. The presence of such obstructions are usually not discovered until the first attempt to milk after freshening. The appearance and consistency of the affected quarters are normal and the duct system is distended with milk. A similar type obstruction, found in a first calf heifer, may be a developmental anomaly.

The significance of tissue obstructions is that patency must be restored to avoid permanent loss of production and the prognosis for correction is very poor if the obstruction is extensive.

Therapy consists of surgical removal of pedunculated polyps using a Hug's tumor remover, alligator forceps or whatever seems practical. Membranous

partitions in the teat cistern can be incised using a sharp Lichty's teat knife. The incision should be made to divide the obstruction into four segments so that milk filling the cistern helps prevent recurrence. Since this type of growth has a tendency to recur during a subsequent dry period, some consider it advisable to open the teat wall with a longitudinal incision over the site of the partition and excise the growth. Aseptic technique and proper closure usually results in rapid healing. The experience of this author, as to closure technique, confirms the advice of Heidrich and Renk (2). They indicate that wound healing is delayed and fistulas formed when the epithelial lining of the teat encroaches on the incision edges and that milk seepage through the incision does not prevent healing. Therefore, before closure of the incision, it is advisable to trim back the epithelial lining from the wound edges for approximately 1 mm. Close the subcutaneous surface and skin with broad contact using non-capillary suture material in a mattress pattern either interrupted or continuous.

Surgical correction of massive proliferation of tissue into the teat cistern or gland cistern is rarely successful. Careful dilation of a constricted teat cistern may result in facilitating milk extraction. Response to excision, either in the teat cistern or gland cistern, is extreme swelling and obliteration of the lumen.

Prevention of the development of tissue obstructions is the same as that noted for milk stones. In addition, traumatic injury or infection in developing mammary glands must be prevented as well as continuous irritation of teats by overmilking or faulty equipment.

Cysts

Occasionally cysts will develop in a superficial area of the gland so as to become unsightly and of concern to the owner. These are apparently caused by a milk inflammatory condition during a dry period. The cysts are up to 2½ to 3 cm in diameter, round, and contain viscous pale yellow fluid. They have no significance to production. Surgical dissection to satisfy esthetic demand is not recommended by this author. A statement by Heidrich and Renk (2) that these cysts are easily dissected from the necropsy specimen does not hold true for the live specimen.

Hematoma of the Mammary Gland

Traumatic injury to the mammary gland may cause a sizeable superficial hematoma. The cause is often attributed to butting by another cow. Usually a forequarter is involved. Swelling may be extensive, making the gland large and cumbersome. Milk secretion is not necessarily altered although there may be a temporary blood tinge to the milk due to capillary damage in the adjacent quarter. The swelling is fluctuant and diagnosis can be confirmed by test puncture.

The significance of this lesion is related to the difficulty of management to prevent further damage and

infection because of extensive swelling and the presence of an excellent media for bacterial growth. Exceptional caution should be exercised to avoid introducing an infection by a diagnostic test puncture. The cow should be placed in an environment free from the possibility of further trauma and contamination. Some authors recommend surgical drainage of the affected area after active hemorrhage has ceased. It is experience of this author that the risk of infection is too great for surgical drainage in most cases. Prevention of further trauma and time will result in gradual resolution.

Steroid Levels in Milk After Induced Lactation

Although unrelated to the assigned subject, it is felt there might be interest in a short report of the results of a project to determine the effect on steroid levels in milk following induction of lactation by hormones.

Four cows were given simultaneous injections of estrogen and progesterone for seven days in accordance with the recommendations by K. L. Smith, Ohio Agricultural Research and Development, Wooster, Ohio. Milk and serum samples were collected from these four cows daily for fourteen days following the initiation of lactation. These samples, and samples collected for 14 days postpartum from four control cows, were submitted for radio-immune-assay determination of estrogen and progesterone.

The mean concentration of progesterone for the induced cows was 696.5 pg/ml (M=93) and for the normal control cows 866.0 pg/ml (M=60). The mean concentration for estradiol 17B in the milk of induced cows was 39.9 pg/ml (M=47) and in the milk of the normal cows 56.2 pg/ml (M=30). Serum concentrations followed the same pattern and were slightly less for both steroids than the concentrations in milk of all cows.

This confirms other reports that hormones used to induce lactation do not affect the levels found in milk subsequently produced.

References

1. Dollar's Veterinary Surgery, Alexander Eger, Inc., Chicago, 1946.
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3. Heinze, C. D., Bovine Medicine and Surgery, Chapter 25, American Veterinary Publications, Inc., Wheaton, Ill., 1970.
4. Oehme, F. W., and Prier, J. E., Large Animal Surgery, Williams and Wilkins, Baltimore, 1974.
5. Schalm, O. W., Carroll, E. J., and Jain, N. C., Bovine Mastitis, Lea and Febiger, Philadelphia, 1971.

Questions (True or False)

1. Infusion of irritating solutions into the mammary gland at drying-off may cause the formation of milk stones.
2. Tissue proliferation in the teat and gland cistern may be caused by ____ or ____.
3. Large growths in the teat and gland cistern are easily removed and patency established.
4. Cysts over 2-1/2 cm in diameter in lactiferous ducts should always be removed surgically.
5. The author recommends conservative treatment of massive hematoma in the mammary gland.