PEER REVIEWED

Tail Docking and Animal Welfare

Pamela L. Ruegg, *DVM, MPVM*
Department of Dairy Science, 1675 Observatory Dr., Madison, Wisconsin, 53706, 608-263-3495, plruegg@wisc.edu

Abstract

Tail docking is a common practice on many dairy farms, and is perceived by many farmers to improve cleanliness and enhance milking parlor efficiency. It is a controversial practice attracting increasing scrutiny by the animal welfare community. Scientific studies have been performed to evaluate physiological and behavioral responses to tail docking in preweaned calves and preparturient heifers. The effect of tail docking on animal behavior, indicators of pain, fly avoidance behaviors, immune responses and circulating plasma cortisol have been reported. Additional studies have been performed to evaluate the effect of tail docking on cleanliness and udder health in lactating dairy cows. The purpose of this paper is to review current research related to tail docking in dairy cattle.

Résumé

L'amputation de la queue est une pratique courante dans plusieurs fermes laitières avec la réputation auprès des fermiers d'améliorer la propreté et d'augmenter le rendement dans la salle de traite. Toutefois, l'amputation de la queue est une pratique controversée qui attire de plus en plus l'attention des chercheurs en bien-être animal. Des études scientifiques ont été menées pour évaluer les conséquences physiologiques et comportementales de l'amputation de la queue chez les veaux présevrés et les génisses préparturientes. Les effets de l'amputation ont été rapportés au niveau du comportement animal, des indicateurs de douleur, du comportement d'évitement des mouches, de la réponse immunitaire et de la concentration de cortisol libre dans le plasma. Des études supplémentaires ont permis d'évaluer l'effet de l'amputation sur la propreté et sur la santé du pis chez les vaches laitières en lactation. Le but de cet article est de faire le point sur la recherche au niveau de l'amputation de la queue chez les bovins laitiers.

Introduction

Removal of the lower portion of a cow's tail is commonly referred to as "tail docking." Tail docking is thought to improve cleanliness, and potentially reduce exposure to mastitis pathogens by reducing contact between tail hair and manure. Tail docking as a routine dairy farm management tool apparently originated in New Zealand, and 35% of Victorian dairy farms responding to a survey reported that they routinely docked tails.[1] Survey responders believed removal of tails resulted in faster milking, reduced risks to the operator and reduced rates of mastitis. An increasing number of US dairy farmers have adopted the use of tail docking, believing it improves milking hygiene and comfort of milking personnel.[5,8]

A variety of methods are used to dock tails. The process is performed on calves, preparturient heifers and occasionally on adult lactating cows.[7,19] Application of an elastrator band to the tail of preparturient heifers below the level of the vulva is the most common method of removal. After application of the band, the tail undergoes atrophy, and in most instances spontaneously detaches four-to-eight weeks post-banding. On many farms, banded tails that fail to detach are manually removed.

While the dairy industry has enjoyed a generally favorable public image, tail docking is considered one of its most controversial management issues. Concern about animal welfare has grown with urbanization and, as predicted 20 years ago, media attention supportive of urban viewpoints is having an increasing impact on agricultural practices.[6] Concerns about tail docking also exist within the agricultural community. Controversy followed an editorial in a popular dairy trade magazine that called for elimination of this practice.[12] Advocates for tail docking cite cow cleanliness and worker convenience as reasons to consider tail docking. Opponents consider tail docking as mutilation and cite increased fly avoidance behaviors, increased need for insecticides, reduced ability for cows to communicate (through tail movement), potential pain and infections in tail stumps, and ethical concerns about the process.[4]

Regulations preventing "unnecessary mutilation" of animals exist in a number of European countries, and tail docking has been prohibited in the United Kingdom for almost 30 years. A number of other countries allow tail docking, but have laws that regulate the procedure. The Canadian Veterinary Medical Association officially opposes the routine use of tail docking of dairy cattle. The Animal Welfare Committee of the American Association of Bovine Practitioners issued a position statement in 1997 that stated "The committee is not aware of information, clearly supporting or condemning tail docking..." but this statement has not been updated. The authors of a review of scientific literature dealing with tail docking recently stated that "there are no apparent animal health, welfare, or human health justifications to support this practice (tail docking) and concluded that "the routine practice of tail docking should be discouraged."[15] The issue of tail docking of dairy cows remains controversial. The objective of this paper is to review current research about the behavioral and physiological effects of tail docking in dairy cattle.

Physiological and Behavioral Responses to Tail Docking[a]

Researchers have examined several potential adverse affects of tail docking.[15] Important welfare issues have included pain caused by tail docking, changes in fly avoidance behavior, immune responses and changes in levels of circulating plasma cortisol.[2,3,9,14,17] Experiments have been performed on both calves and pre-parturient heifers.

Physiological responses to tail docking in calves. Cortisol responses of calves docked using rubber rings or a hot cautery iron (commonly used in lambs) with or without the use of local anesthesia were compared.[9] Additional treatment groups included calves left with intact tails, epidural only, epidural preceding rubber ring application, and epidural preceding hot cautery iron. Sixty-three calves (three to four months of age) were randomly assigned to one of six groups and monitored for 96 hours post-treatment. Cortisol values were compared among groups twice before treatment and at 15, 30, 60, 90, 120, 150, 180, 240, 300, 360, 420 and 480 minutes (min), and again at 24, 48, 72 and 96 hours after treatment. Calves that were docked using rubber rings had no significant change in plasma cortisol concentration throughout the sampling period. Calves that received local anesthesia and a rubber ring showed a small drop in plasma cortisol concentrations that returned to normal within one hour. Calves docked using a cautery iron had a significant increase in plasma cortisol concentration lasting up to 45 minutes post-treatment. Use of local anesthesia in calves docked using a cautery iron significantly increased cortisol concentrations for one hour. Control calves exhibited a statistically significant increase in cortisol concentration for the first 15 minutes of observation (increased from 10 to 15 ng/ml). The authors concluded there was little evidence to suggest that cortisol responses to tail docking were more distressing than restraint caused by blood sampling. Additionally, they concluded that local anesthesia had no detectable benefits due to little apparent distress.

Acute responses to tail docking using rubber rings or a hot cautery iron were also examined in seven-to-17-day-old calves (n = 36).[17] Calves were randomly allocated to three groups: docked using rubber rings, docked using cautery iron or control (tail handled). Cortisol responses were repeatedly (7-9 times) measured on day 0 and day 1, and intake, weight gain and health were monitored for three weeks. No significant differences in cortisol concentrations were found among treatment groups, except at 60 minutes after treatment, when control animals had lower levels than calves docked using rubber rings. No significant differences in milk intake, weight gain, body temperature or fecal consistency were identified. The authors concluded that tail docking of seven-to-17-day-old calves resulted in few acute effects.

Physiological responses to tail docking in heifers. Immunological and endocrine responses to tail docking with rubber rings were examined using primiparous heifers.[2] Twenty-one animals were observed for 24 hours pre- and post-banding; four days later they were monitored for 24 hours pre- and post-removal of the atrophied tail. There was a significant treatment-by-time interaction for plasma haptoglobin concentration, but no overall treatment effect was detected. There was a significant haptoglobin increase at 168 hours and 240 hours post-docking ($P < 0.05$) for all treatments. Circulating cortisol concentrations in banded heifers were lower than controls 12 hours post-banding ($P < 0.05$). A similar trend was detected at 46 hours post-docking ($P = 0.06$). The authors concluded that tail banding did not significantly affect cortisol or immune measures in primiparous heifers.

Long-term physiological responses to tail docking and tail atrophy have been determined for preparturient heifers.[15] Pregnant heifers (n = 24) approximately two-to-four months prepartum were randomly assigned to one of four treatment groups: 1) tails were cleaned and handled; 2) tails were cleaned, handled and an elastrator band applied to the tail; 3) an epidural was administered 15 minutes before cleaning and handling, and 4) an epidural was administered 15 minutes before application of an elastrator band. Atrophied tails were allowed to fall off without assistance until 42 days post-treatment, when remaining atrophied tails (7 of 12) were removed. Behavioral observations and physiological responses were collected for six weeks. Heart rates and body temperatures were collected at least once daily. Blood samples were obtained at -45, -15 and -1 minutes before application of tail bands, and 15, 30, 60, 90, 120, 180, 240, 360 and 720 minutes after application. Additional blood samples were obtained after the morning observation period on days 4, 14 and 21. Plasma cortisol concentrations remained within limits previously described for non-stressed animals,[3,17] and no significant differences were detected among groups ($P = 0.49$). There was no significant difference in plasma cortisol concentration within groups over the observation period ($P = 0.16$) or any significant treatment-by-time interaction ($P = 0.36$). Except for neutrophils, which increased slightly and proportionally for all groups with time, all hematological data were within normal limits for the entire study period, and no significant changes in hematological data among groups could be related to treatment ($P > 0.17$). There were no significant differences ($P = 0.99$) in heart rate among treatment groups throughout the study. Body temperatures were within limits previously described for healthy cattle, and no significant differences were observed among treatment groups ($P = 0.42$). It was concluded that no significant immunological or hormonal responses were caused by tail banding or tail atrophy.

Behavioral responses to tail docking in calves. Three studies have reported behavioral responses of calves to tail docking.[10,14,17] Behavioral responses to tail docking with a rubber ring, with or without use of local anesthesia, were examined in 45 calves three-to-four months of age.[10] The authors reported that 67% of calves elicited an immediate behavioral response to tail docking with rubber rings. Tail shaking was detected in 10 of the 15 banded calves during the first 30-minute period after treatment, and increased vocalization was noted for 90 minutes after application of rubber rings. Use of local anesthesia before docking inhibited all behavioral responses for approximately 2.5 hours. Differences in feeding and ruminating behavior were not noted. The authors concluded that tail docking using rubber rings elicited a behavioral response, but not enough to cause a significant difference in normal feeding and ruminating behaviors.

Video cameras were used to monitor acute behavioral responses to tail docking in seven-to-17-day-old calves for a total of five days.[17] Moderate behavioral effects were noted for animals docked with rubber rings compared to control calves and calves docked using a cautery iron. Use of rubber rings for docking increased tail grooming behaviors for the entire observation period. Shorter periods of standing and lying, and higher frequencies of those behaviors, were observed for calves docked with rubber rings as compared to other groups. The authors noted that tail docking using a rubber ring apparently caused some degree of discomfort to calves docked within the first few weeks of life.

An influence of calf age on behavioral responses to tail docking using rubber rings was identified in another study.[14] Behavioral observations were recorded during 10 days for heifer calves (n = 40) randomly assigned to docked (rubber ring) or control groups. Separate analyses were performed for young calves (≤ 21 days of age, n = 22) and older calves (22 – 42 days of age, n = 18). No significant differences in eating, standing or walking behavior ($P > 0.25$) were detected based on treatment. No significant differences in behavior of young calves could be detected based upon treatment. However, older tail-docked calves tended to spend more time in rear visualization ($P = 0.056$), and were more restless as compared to control calves ($P = 0.01$) after application of bands on the day of treatment, and on days 8 and 9.

Behavioral responses to tail docking in heifers. Two studies have recorded behavioral responses to tail docking in primiparous heifers,[2,14] and two studies have described fly-induced behaviors in docked animals.[3,11] Acute behavioral responses to tail docking with rubber rings were observed in primiparous heifers one month before projected parturition.[2] Twenty-one animals were observed for 24 hours before and after banding, and for 24 hours before and after removal of atrophied tails four days post-banding. There were no significant differences in behavioral responses between treatments except for the amount of time spent eating: docked heifers spent more time eating after banding and less time eating ($P< 0.05$) after removal of the tail, compared to control heifers ($P < 0.01$). No significant differences were found in lying, standing, walking, drinking, head-to-tail viewing, or grooming behaviors. The authors concluded that tail banding had no significant effect on behavior.

Trained observers collected behavioral responses of preparturient heifers that received one of four treatments: 1) tail cleaned and handled; 2) tail cleaned, handled and received elastrator band; 3) tail cleaned and handled after receiving an epidural; or 4) application of elastrator band after receiving an epidural. Numerous observations were performed on the day of treatment, followed by observations twice daily for weeks 1 and 2, once daily for weeks 3 and 4, and once daily during weeks 5 and 6.[14] All behavioral observations were scan observations obtained by trained individuals using a standard recording form. Pre-defined behaviors noted included: eating, rumination, standing, walking, tail shaking, vocalization, foot stamping, tooth grinding, changes in posture, restlessness and tail tucking. No significant differences were detected among treatments for any behaviors during any time period ($P > 0.14$). The authors concluded that tail banding and atrophy did not affect behavior of preparturient heifers.

In another study, fly induced responses of dairy cattle were monitored in five sets of twin 5-year old cows.[11] One twin served as a control, and the other twin was docked at 18 months of age. All animals were monitored for four, 1-month periods throughout the year. Behavioral changes (such as tail flicking, skin flicking, movement of legs, etc.) and adrenal responsiveness to adrenocorticotropic hormone (ACTH) were recorded and compared among sets of twins. Increased tail flicking was observed in docked animals and they had significantly more flies (15 versus 1) on the rear half of the body. Adrenocortical responses were not significantly different between the docked and non-docked animals. The authors concluded that the additional fly load on docked animals caused moderate distress at most.

Fly avoidance behaviors were compared in first-lactation cows that were either docked (n = 8) or not docked (n = 8).[3] Animals were observed three times daily for a total of five days. There were no significant differences in the numbers of stable flies on the front legs of the cows, but docked cows had nearly twice as many flies on their rear legs as compared to those with intact tails ($P < 0.01$). Fly avoidance behaviors (such as feed tossing) were increased in the docked animals, while tail swinging was increased in the control animals. Foot stamping was identified only in docked animals. Overall, fly numbers and fly avoidance behaviors were increased in docked animals in this study.

Tail Docking and Udder Health

Many farmers and consultants perceive that tail docking results in improved animal cleanliness and udder health. To date, these perceptions have not been scientifically validated. In one study, the effect of tail docking on cow cleanliness and somatic cell counts (SCC) was evaluated in a single herd, housed in freestalls, over an eight-week period.[18] Tails were either docked (application of rubber ring followed by removal after two weeks of atrophy; n = 275 enrolled, 169 completed study) or left intact (n = 212 enrolled, 105 completed study). Cleanliness scores (using a four point scale) were recorded for available animals on a weekly basis by counting debris in a grid placed on the midline of the back (5 cm anterior to the base of the tail) or on the rump (3 cm from midline). Udder cleanliness was scored twice during evening milkings using the same grid applied to the back of the udder (above the teats) and separately by counting the number of teats that contained obvious debris. There were no significant differences in cleanliness scores for any of the measured areas between docked and intact animals ($P > 0.17$), nor any significant differences in SCC or udder cleanliness ($P > .31$). The authors concluded there was "little merit to adopting" tail docking.

A longer duration study with more animals was conducted to determine the effect of tail docking on SCC, intramammary infection (IMI) and udder and leg cleanliness in eight commercial dairy herds housed in freestalls.[13] Lactating dairy cows (n = 1250) were blocked by farm and randomly allocated to tail-docked or control groups. Milk samples, SCC and hygiene scores were collected for eight-to-nine months. Prevalence of IMI was determined for each of the five occasions when milk samples were obtained. Udder and leg cleanliness were assessed during milk sample collection using a standardized scoring method. Docked and control animals were compared by logSCC, prevalence of IMI, and leg and udder cleanliness score. At enrollment, there were no significant differences in parity, daily milk yield, logSCC, or days in milk (DIM) between treatment groups. At the end of the study period, a similar proportion ($P = 0.73$) of cows had been culled in the docked (12.16%) and control (12.96%) groups. There were no significant differences between treatment groups for SCC (Figure 1) or udder or leg hygiene scores (Figure 2). Prevalence of contagious, environmental and minor pathogens did not significantly differ between treatment groups (Table 1).

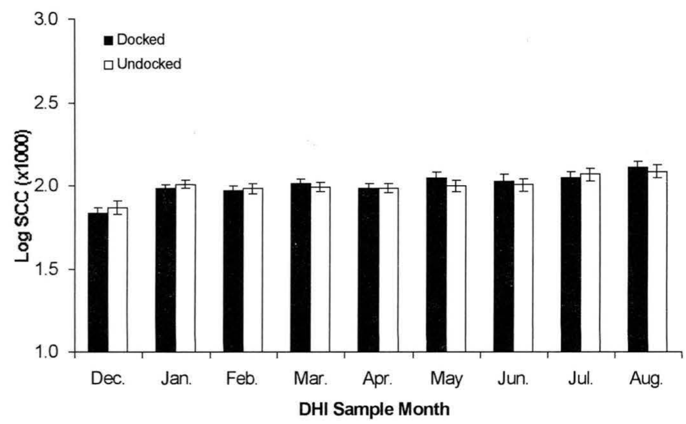

Figure 1. Log somatic cell count by treatment and month (from Schreiner and Ruegg, *J Dairy Sci* 85:2503-2511, 2002)

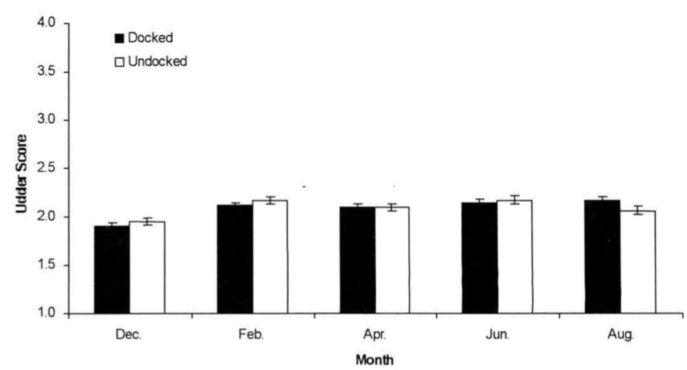

Figure 2. Udder hygiene scores by treatment and month. Scale is 1 (cleanest) to 4 (dirtiest). (from Schreiner and Ruegg, *J Dairy Sci* 85:2503-2511, 2002)

Table 1. Prevalence of intramammary infection by treatment and month (SE).[a]

	December	February	April	June	August
			Percent (SE)		
Contagious[b]					
Docked	2.2 (1.1)	4.1 (1.8)	5.7 (3.3)	8.1 (2.8)	8.6 (3.8)
Control	2.1 (0.9)	3.4 (2.0)	4.8 (3.2)	5.3 (2.8)	8.3 (4.8)
Environmental[c]					
Docked	10.4 (3.0)	10.9 (2.1)	11.8 (1.8)	12.6 (2.3)	7.6 (2.3)
Control	12.0 (2.4)	13.4 (2.2)	11.3 (1.5)	8.0 (1.7)	7.6 (1.9)
Minor[d]					
Docked	38.6 (6.8)	38.9 (4.0)	35.2 (3.7)	28.9 (3.1)	24.6 (3.9)
Control	39.0 (6.1)	39.4 (4.4)	36.1 (3.4)	30.7 (3.7)	28.0 (2.8)

[a]columns may sum to >100% because of multiple isolates from single samples
[b]*Staphylococcus aureus* and *Streptococcus agalactia*
[c]*Escherichia coli, Klebsiella* spp, *Streptococcus* spp, *Enterococcus* spp.
[d]coagulase negative *Staphylococcus* spp, *Actinomyces* spp, *Corynebacteria* spp.
(from Schreiner and Ruegg, *J Dairy Sci* 85:2503-2511, 2002.)

Conclusions

Many in the dairy industry have perceptions about tail docking, and the number of research studies available on this subject are increasing. Available data do not suggest that tail docking results in measurable increases in indicators of animal stress. A number of studies have found no significant increase in cortisol levels due to tail docking, and there have been no indications of stress leukograms in studies that have examined blood. No measurable differences in feed intake, calf growth or immune function due to tail docking have been reported. Several mild behavioral effects of tail docking of calves have been identified based on age, but very few behavioral responses have been identified in preparturient heifers. Current research suggests that preparturient heifers may be less sensitive to application of tail bands than younger animals.

Fly avoidance is an important function of the tail and research has identified several modest changes in behavior where docked animals exhibit in an attempt to reduce fly exposure. Farmers who utilize tail docking should recognize these changes and use appropriate management to reduce exposure to flies.

Contrary to popular opinion, tail docking does not appear to affect cleanliness of udders or legs, nor does there appear to be a relationship between tail docking and milk quality. In both commercial field studies, animals in both treatment groups (docked or intact tails) were intermixed in modern freestall facilities. It is possible that tails of undocked cows could have contaminated some of the docked animals, but it is unlikely that this effect was significant because there was very little variability in cleanliness measures. It is highly likely that other factors (individual animal behavior, housing, handling and facility management) have much greater influence on cow hygiene and mastitis than tail docking.

Comfort and cleanliness of farm personnel are often cited to justify docking tails but research on this issue is sparse. It is likely that a consensus about tail docking within the dairy industry will be difficult to achieve, and the dairy industry must balance public perception and ethical concerns about tail docking with legitimate farm management needs.

Footnote

[a]Adapted from Schreiner, DA, 2001. Effects of tail docking on behavior, physiology and milk quality of dairy cattle. MSc. Thesis, University of Wisconsin, Madison.

References

1. Barnett JL, Coleman GJ, Hemsworth PH, Newman EA, Fewings-Hall S, Zini C: Tail docking and beliefs about the practice in the Victorian dairy industry. *Aust Vet J* 11:742-747, 1999.
2. Eicher SD, Morrow-Tesch JL, Albright JL, Dailey JW, Young CR, Stanker LH: Tail-docking influences on behavioral, immunological and endocrine responses in dairy heifers. *J Dairy Sci* 83:1456-1462, 2000.
3. Eicher SD, Morrow-Tesch JL, Albright JL, Williams RE: Tail-docking alters fly numbers, fly-avoidance behaviors and cleanliness, but not physiological measures. *J Dairy Sci* 84:1822-1828, 2001.
4. Halverson M: Tail docking dairy cattle. Animal Welfare Institute 51(3):1-7, 2002. available online at: www.awionline.org/pubs/quarterly/fall02/taildocking.htm
5. Johnson AP: Mastitis control without a slap in the face. *Proc Am Assoc Bov Pract Conf* 24:146, 1991.
6. Kilgour R, Dalton C: Livestock behaviour: a practical guide. Westview Press, Boulder, CO, 1984.
7. Kirk JH: Tips on tail trimming. *Western Dairyman,* April 1999, pp 40-41.

8. McCrory J: Do cow's tails help cause mastitis? *J Agric* 74:341, 1976.
9. Petrie NJ, Mellor DJ, Stafford KJ, Bruce RA, Ward RN: Cortisol responses of calves to two methods of tail docking used with or without local anesthetic. *NZ Vet J* 44: 4-8, 1996.
10. Petrie NJ, Stafford KJ, Mellor DJ, Bruce RA, Ward RN: The behaviour of calves tail docked with a rubber ring used with or without local anesthesia. *Proc NZ Soc An Prod* 55:58-60, 1995.
11. Phipps AM., Matthews LR,Verkerk GA: Tail docked dairy cattle: fly induced behavior and adrenal responsiveness to ACTH. *Proc NZ Soc Anim Prod* 55:61-63, 1995.
12. Quaife T: Tail docking makes little sense. *Dairy Herd Management,* Oct 16, 2002.
13. Schreiner DA, Ruegg PL: Effects of tail docking on milk quality and cow cleanliness. *J Dairy Sci* 85:2513-2521, 2002.
14. Schreiner DA, Ruegg PL: Responses to tail docking in calves and heifers. *J Dairy Sci* 85:3287-3296, 2002.
15. Stull CL, Payne MA, Berry SL, Hullinger PJ: Evaluation of the scientific justification for tail docking in dairy cattle. *J Am Vet Med Assoc* 220:1298-1303, 2002.
16. Taylor GB: Prevention of unnecessary mutilation of farm livestock. *Vet Rec* 95: 369-371, 1974.
17. Tom EM, Rushen J, Duncan IHJ, de Passille AM: Behavioural, health and cortisol responses of young calves to tail docking using a rubber ring or docking iron. *Can J Anim Sci* 82:1-9, 2002.
18. Tucker CB, Fraser D, Weary DM: Tail docking cattle: effects on cow cleanliness and udder health. *J Dairy Sci* 84:84-87, 2001.
19. Tucker CB, Weary DM: Tail docking in dairy cattle. Animal Welfare Information Center Bulletin 11 (3-4):1-3, 2002. available online at : www.nal.usda.gov/awic/newsletters/v11n3/11n3tuck.htm

Abstract

The Effect of PGF2α on Uterine Health and Milk Yield in Holstein Cows with Acute Puerperal Metritis[a]

Pedro Melendez, *DVM, MS[1];* **Jennifer McHale,** *DVM, MS[2];* **Julian Bartolome,** *DVM, MS, ACT[1];*
Art Donovan, *DVM, MSc[1]*
[1]College of Veterinary Medicine, University of Florida
[2]North Florida Holstein, Inc, Bell, Florida

The concentration of PGF2α during the peripartum period is high, but it decreases to basal levels around 8 d post partum (pp) in dairy cows. PGF2α has been used widely to control the estrus cycle, but it has not been evaluated as a modulator of the anatomical uterine involution in cows with acute puerperal metritis (APM). The objectives of this study were to evaluate the effect of two doses of PGF2α (Lutalyse®) injected at d 8 pp on uterine involution and daily milk yield in Holstein cows with APM. The study was conducted in a 3600 cow Holstein dairy with milk RHA of 23,540 lb (10,700 kg). Cows were housed in dry-lots, fed a TMR and milked 3X daily. Cows that developed APM (foul-smelling uterine discharge) were treated with ceftiofur sodium for three days and kept in the milking herd.

Between October and December 2002, 90 cows with APM were randomly assigned to either a treatment or a control group. Treatment consisted of two injections IM of PGF2α 8 hours apart (n=45 cows). Control cows (n=45) received no injection. Outcome variables were uterine ultrasonographic evaluation (Aloka, 500) at d 12 pp, uterine score by rectal palpation and daily milk production up to 25 d pp. The study was blind for the evaluators. Ultrasonographic measurements of uterine diameter from serosa to serosa and from sub-mucosa to sub-mucosa at the level of the greater curvature of both horns were made. From these two measurements the width of the myometrium was determined. Uterine score considered the size and tonicity of the uterus (3 - flaccid uterus larger than one hand; 2 - uterus with moderate tonicity and smaller than one hand; 1 - high tonicity and less than three fingers width). Milk production was recorded daily by computer software (AfiFarm, S.A.E. Afikim®, Israel). Ultrasonographic findings were analyzed by ANOVA. Milk yields were analyzed by repeated measures ANOVA. Models considered effect of treatment, parity, day and the triple interaction. Uterine score was analyzed using the Median-Rank Test.

For the pregnant horn, there was a treatment∗parity interaction. Within parity 1, treated cows had a serosa to serosa and sub-mucosa to sub-mucosa diameter lower than controls (4.92 vs. 5.65 cm, and 2.45 vs. 3.12 cm, respectively; $P \leq 0.05$). Within multiparous cows, there was no treatment effect. Thickness of the myometrium was similar between treatments and within parities as well ($P > 0.05$). Within parity 1, uterine score was lower in treated cows compared to controls ($P \leq 0.05$). In parity 1, milk yield was not different between groups within days ($P > 0.05$).

It is concluded that PGF2α given twice at 8 d pp, in primiparous cows with acute puerperal metritis, was associated with a decrease in the size of the uterus at d 12 pp. This response might be attributed to the effect of prostaglandins on smooth musculature.

[a]*Presented at the 2003 American Association of Bovine Practitioners Conference, September 18-20, 2003, Columbus, Ohio.*

Interested in Becoming Certified?
The American Board of Veterinary Practitioners (ABVP) promotes and recognizes the highest standards in the art and science of contemporary veterinary clinical practice. The Diplomates of ABVP have a common desire and willingness to deliver superior, comprehensive, multi-disciplinary veterinary service to the public. They are veterinarians who have demonstrated expertise in the broad range of clinical subjects relevant to their practice and display the ability to communicate medical observations and data in an organized and appropriate manner. Unlike other AVMA specialty boards, which are devoted to specific disciplines or organ systems, ABVP awards species-specific certification in Beef Cattle Practice, Dairy Practice, and Food Animal Practice.

To ensure that certification is accessible to active practitioners, the accreditation procedure relies upon high quality, practice-related experience, in lieu of lengthy, institution-based, multi-year training programs. Formal postgraduate education is not required. Nevertheless, the credentialing process is rigorous and demanding. Demonstration of a thorough mastery of the field is essential for achieving certification.

<u>Beef Diplomates</u>

Dr. William Baker
Dr. Dawn Capucille
Dr. Thomas Hairgrove
Dr. Mark W. Hilton
Dr. Peter Moisan
Dr. Gene Niles
Dr. Melvin E. Pence
Dr. Scott Poock
Dr. Glenn Rogers
Dr. Jerome Rusch
Dr. Richard Posey

<u>Dairy Diplomates</u>

Dr. Kevin Anderson
Dr. Mark Armfelt
Dr. Richard Barker
Dr. Francois Bernard
Dr. Jenks Brit
Dr. Paul Busman
Dr. Meg Cattell
Dr. Nicholas Chuff
Dr. Joseph Colontino
Dr. Victor Cortese
Dr. John Currin
Dr. Luc DesCoteaux
Dr. John Fetrow
Dr. Stephen Foulke
Dr. James Fountaine
Dr. Charles Gardner
Dr. Charles Jamison
Dr. Dagny Leininger
Dr. Marcus Mueller
Dr. Jeffrey Musser
Dr. Arden J. Nelson
Dr. Ken Nordlund
Dr. William Raphael
Dr. Jerry Roberson
Dr. Pamela Ruegg
Dr. Christian W. Steenholdt
Dr. Steven Stewart
Dr. Ron Terra
Dr. Jonathan Townsend
Dr. Frank Welcome
Dr. David Wolfgang

<u>Food Animal Diplomates</u>

Dr. Kenneth Angel
Dr. Steven Berkenkamp
Dr. James Bradford
Dr. Paul Coe
Dr. Ross Cowart
Dr. Page Dinsmore
Dr. Bill DuBois
Dr. Sherrill Fleming
Dr. Majorie Gill
Dr. David Gnad
Dr. Walter Hylton
Dr. John Kirkpatrick
Dr. Michael Lane
Dr. Charles McCauley
Dr. Robert Miller
Dr. Arlen Mills
Dr. Peter Moisan
Dr. Thomas Powe
Dr. Greg Queen
Dr. Billy Smith
Dr. David Smith
Dr. Kent Smith
Dr. Robert Smith
Dr. James Thorne
Dr. Sarel Van Amstel
Dr. Kevin Washburn

Visit our website at WWW.ABVP.COM