Evidence Suggests No Benefit to the Cow From Tail Docking

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Introduction

The practice of removing a portion of a dairy cow's tail, i.e., tail docking, originated in New Zealand and became more common on US dairy farms in the late 1980s and early 1990s. It began as a means of reducing the incidence of leptospirosis in farm workers, increasing udder cleanliness, and improving milk quality (Phipps et al., 1995). These reasons are cited in the continuation of tail docking as a routine practice.

Despite its growing popularity with producers, tail docking of dairy cows, heifers and calves remains a controversial aspect of animal welfare for the general public of the United States. Due its ease of recognition, it is often highlighted in negative portrayals of dairy farming such as the recent ABC News Nightline feature "Got Milk? Got Ethics? Animal Rights v. US Dairy Industry" or the animated short film "The Meatrix II: Revolting."

In addition to the potentially negative public perception, none of the original rationales have been supported by the peer-reviewed research conducted on the topic. In other words, tail docking represents a "lose-lose" proposition for US dairy farmers. For this reason, it is time to voluntarily cease the utilization of tail docking as a routine practice.

State of Tail Docking in the United States

The number of farms engaging in tail docking (approximately 50 percent; USDA, 2009) has remained relatively stable over the past decade. The total number of cows whose tails are docked, however, increased from 32.9 percent in 1996 to 38.8 percent, as of 2007. Furthermore, tail docking varies by region and farm size. Over 80 percent of dairy farms in the western US have no cows with docked tails compared to only 48 percent of farms in the eastern US (USDA, 2010). Similarly, 55 percent of cows on medium-sized farms (those with between 100 and 499 cows) compared to 27 percent of cows on small farms (< 100 cows) or 34 percent of cows on large farms (≥ 500 cows; USDA, 2010) had docked tails. Banding was the most common method that cattle were subjected to (90 percent) or chosen by farmers (87 percent), followed by surgically removed (5 percent of cows or 2 percent of farms), and unknown (2 percent of cows or 9 percent of farms; USDA, 2010). Unknown was attributed mainly to purchased cows (USDA, 2010). Cows were most commonly docked at 2 years of age or greater (38 percent), followed by less than 2 months old (28 percent), and the remaining cows were done in between those two extremes (USDA, 2010). Pain mitigation, through the use of anesthetics or analgesics, was a standard practice on only 1 percent of farms (USDA, 2010). The state of tail docking within the US suggests that tail docking may be on course to phase itself out. The general trend in dairy farming was expansion and movement

westward. Both of these factors were on the lower end of producers engaging in tail docking.

More importantly, there is legislative momentum towards passing bans on tail docking. In California, Senate Bill No. 135, which bans tail docking, was recently passed and signed by the governor. A similar bill has been proposed in New York. Finally, the American Veterinary Medical Association has issued a strong statement against use of tail docking due to the lack of evidence that it provides benefits to the animal (AVMA, 2004).

Strongest Evidence for the Voluntary End of Tail Docking

The strongest condemnation of tail docking stemmed from the lack of support for the initial three reasons (risk of leptospirosis, improved udder hygiene, and increased milk quality) for the introduction of the practice. Each is reviewed in the following sections.

Risk of Leptospirosis for Farm Workers

Leptospirosis was defined as a zoonotic disease caused by the gram-negative spirochetes from the genus Leptospira (Guerra, 2009). In humans, the disease has two distinct phases. The first was characterized by mild flu-like symptoms (Guerra, 2009). In the second phase, the disease can develop into anicteric and icteric forms (Guerra, 2009). The anicteric form is milder and characterized by severe headache and stiffness of the neck (Guerra, 2009). The icteric form is more severe and characterized by jaundice, renal dysfunction, pulmonary dysfunction or hemorrhagic manifestations. If left untreated, it has a high mortality rate stemming from renal failure (Guerra, 2009). Animals tend to be infected early in life, but urinary shedding increases with age (Guerra, 2009). In nonhuman animals, leptospirosis frequently does not progress beyond the subclinical stage (Guerra, 2009). In cattle, the clinical signs were dependent on age of infection; stillbirths or abortions may be the only observable sign of infection in adult cattle compared to the jaundice, fever and hematuria (that is often fatal) observable in calves (Guerra, 2009).

In some countries, “dairy farm fever” or “milker’s fever” are the common names for leptospirosis, which suggests a strong historical association between the disease and dairy farming (Stull et al., 2002). Despite this historical association, the reported incidence of the disease was quite low, between 50 and 100 cases annually, from 1967 to 1995 (Stull et al., 2002). Similarly, only 2.5 percent of the 511 veterinarians attending the 2006 AVMA Annual Convention tested positive for leptospiral infection (Spotts Whitney et al., 2009). The variable found to put veterinarians at the greatest risk for leptospiral infection was treating a dog with flu-like symptoms (Spotts Whitney et al., 2009). This may be explained by the low number of cattle who were actually infected. A survey conducted across the US isolated leptospires from the kidney samples of 87 cows out of a total sample population of 5,142 (Stull et al., 2002).

The most condemning evidence against the hypothesis that tail docking could reduce leptospirosis came from an epidemiological study conducted in New Zealand in the early 1980s. This study found no relationship between milker’s leptospiral titers and the cow’s tail status (Mackintosh et al., 1982). Furthermore, the study concluded elimination of leptospirosis from the herd was the only effective means of protection for the farm workers (Mackintosh et al., 1982).

Vaccinations against leptospirosis were part of the routine protocols on 68 percent of farms in the most recent USDA survey (USDA, 2010). Similar to tail docking, percentage of farms that routinely vaccinated against leptospirosis varied across regions and farm size. The smallest percentage giving the vaccine were those classified as “small” (63.2 percent), the largest

percentage (86.7 percent) occurred on those classified as “large” with farms classified as medium as the intermediate (78.1 percent; USDA, 2010). Vaccination against leptospirosis occurred greater percentage of farms in the western US (78.8 percent) compared to the eastern US (66.9 percent), which was consistent with the region having the greatest percentage of farms without docked tails. Increasing the percentage of farms vaccinating against leptospirosis may be a key factor in eliminating tail docking while maintaining worker safety. A national vaccination program in New Zealand resulted in an almost seven-fold reduction in the number of reported cases of leptospirosis (Stull et al., 2002).

Improved Udder and Leg Hygiene

Early work in New Zealand did not observe any effects of tail docking on udder hygiene for cows housed on pasture (Wilson, 1972; Matthews et al., 1995). Wilson (1972) did observe one difference in cleanliness. The area adjacent to the base of the tail was cleaner in cows with docked tails, but not the udder itself (Wilson, 1972).

More recently, the udders of the docked and intact cows were scored for degree (number of panels containing soiling on a 14-square grid) and severity (on a scale of 1 to 4) of soiling and the number of soiled teats counted (Tucker et al., 2001). Tail docking had no effect on the cleanliness of the udder or teats (Tucker et al., 2001). Udder hygiene of cows housed in tie-stalls was not affected by docking (Eicher et al., 2001), which indicates the lack of differences between docked and intact cows reported by Tucker et al. (2001) was not due to the cross-contamination of the docked cows by the intact ones.

A similar response in overall udder cleanliness was established on eight commercial dairy farms in Wisconsin (Schreiner and Ruegg, 2002a). Schreiner and Ruegg (2002a) did observe a significant farm/treatment interaction, which suggests udder hygiene was strongly affected by management practices beyond tail docking. For example, the mechanical removal of manure from slatted floors resulted in a 27 percent improvement in udder hygiene relative to the udders of cows without mechanical barn cleaners (Magnusson et al., 2008), and udder preparation for milking took less time for cows housed with more restrictive neck rails, resulting in cleaner freestalls, compared to less with less restrictive neck rails (Bernardi et al., 2009). Finally, a retrospective study at Miner Institute determined that tail status (docked, tail trimmed or intact) had no effect on hygiene score and all means were below a score of 3 (on a scale of 1 to 4; Krawczel, 2008).

Although this work was not peer-reviewed, it suggested that trimming the switch hair of tails may serve as a viable alternative to tail docking. A survey of Victorian dairy farms reported that farmers who routinely trimmed tails did so an average of twice a year with a range of 1 to 12 times per year (Barnett et al., 1999). This indicates trimming would require a minimal amount of labor to be incorporated into routine farm management.

The results for cleanliness beyond udder hygiene were less consistent, but still do not support the hypothesis that tail docking improves hygiene. The rump and back of the docked and intact cows were scored for degree (number of panels containing soiling on a 14-square grid) and severity (on a scale of 1 to 4) of soiling and the number of soiled teats counted and did not differ between treatments (Tucker et al., 2001). Additionally, a subset of cows who remained in the pens for the duration of the study were examined for degree of soiling of the rump on weeks one, two, three, five and eight (Tucker et al., 2001). Cleanliness scores improved over the course of the study, but, again, no treatment effect was evident (Tucker et al., 2001). Another study did observe cleaner legs on docked cows relative to intact cows for one out of the five months, and there tended to be lower hygiene scores associated with tail

docking (Schreiner and Ruegg, 2002a). However, the mean hygiene score for legs was less than a 3 (on a scale of 1 to 4; Schreiner and Ruegg, 2002a). This evidence suggests that the observed differences were not biologically meaningful (Schreiner and Ruegg, 2002a). Work at Miner Institute suggested that leg hygiene was dependent on farm management (Krawczel, 2008). At Miner Institute, tail status had no affected on leg hygiene; however, at a collaborating farm, the legs and flanks of cows with docked tails were cleaner than intact cows, with trimmed as the intermediate (Krawczel, 2008). Similar to Schreiner and Ruegg (2002a), the differences were less than a unit apart suggesting the differences were not biologically meaningful. Finally, the rear quarters of docked cows were a full point lower (on a scale of 1 to 5) than those with intact tails when cows were housed in tie-stalls (Eicher et al., 2001). Despite the size of the difference, it is still questionable if this represents a biologically meaningful difference as the means were 3.5 for the intact and 2.5 for the docked.

Schreiner and Ruegg (2003) only observed a significant contrast between hygiene scores of 2 and 4 (on a scale of 1 to 4) when leg hygiene was evaluated. This suggests that a hygiene score may have to be at the upper end of the subjective scale to result in a significant biological difference. The subjective nature of hygiene scoring also must be considered when establishing the separation for biologically meaningful differences. Research by Schreiner and Ruegg (2003) demonstrated that cows scoring a 3 or a 4 were 1.5 times more likely to test positive for a major pathogen than those cows with scores of 1 or 2. The majority of data on udder hygiene found mean scores to be less than 3 (on a scale of 1 to 4), which suggests that all tail management practices can result in the level of udder hygiene required for maintaining milk quality.

Milk Quality and Udder Health

In a series of recent studies (Tucker et al., 2001; Schreiner and Ruegg, 2002a; Krawczel, 2008) milk quality was evaluated as a function of somatic cell count (SCC) or somatic cell score (SCS), which is also an indication of the pervasiveness of subclinical mastitis on farms. Additionally, udder health has been evaluated on the basis of incidence of mastitis (Schreiner and Ruegg, 2002a). Regardless of methodology, tail docking did not affect milk quality. The median SCC observed by Tucker et al. (2001) was not affected by tail docking. Log SCC increased over time, but no treatment (docked vs. intact) effect was reported by Schreiner and Ruegg (2002a). The mean SCS of intact, trimmed or docked cows did not differ (Krawczel, 2008). Similarly, no significant differences between treatments in the prevalence of mastitis, due to contagious or environmental pathogens, were observed. Finally, milk production was not affected (Tom et al., 2002). Collectively, these data indicated that tail status did not increase the immunological changes or alter the biological function of the udder.

Evidence for the Voluntary End of Tail Docking Beyond the Initial Rationale

The three original reasons for tail docking were primarily focused on improving milk quality. Along with refuting these justifications, the recent work on tail docking has demonstrated the potential costs to the cow when subjected to tail docking.

Increased Fly Pressure and Avoidance Behaviors

Fly counts were made on lactating primiparous cows housed in a tie-stall facility at 800, 1,200, and 1,600 over five days (Eicher et al., 2001). Neither the total number of flies nor

the number of flies across each time period on the front legs of the intact or docked cows were observed to be different (Eicher et al., 2001). Conversely, cows with docked tails experienced twice as many flies on their rear legs relative to the intact cows (Eicher et al., 2001). Docked cows experienced greater fly counts on the rear legs across each of the sampling times also (Eicher et al., 2001). There was no evidence of changing fly pressures to explain the behavioral changes (Eicher et al., 2001). Finally, the docked cows tended to stand more during the sampling occurring at noon, which could indicate reduced comfort (Eicher et al., 2001).

Flies were more problematic for calves with docked tails also (Eicher and Dailey, 2002). When observed at 8 a.m. and noon, fly pressure did not differ between docked or intact calves; however, at 4 p.m., there were greater numbers of flies observed on the rear legs of the docked calves (Eicher and Dailey, 2002). This difference corresponded to the time of day, when overall fly pressure was the highest. Intact calves swung their tails more and twitched their ears less than docked calves at all three sampling times (Eicher and Dailey, 2002). Additionally, docked calves licked significantly more than the intact calves (Eicher and Dailey, 2002). This indicates the importance of the tail for fly avoidance.

Increased Sensitivity Suggests Chronic Pain

The other method for demonstrating chronic pain was increased sensitivity to heat or cold stimulus. The response to stimulus was measured by monitoring the behavior of intact and docked heifer for 5 minutes following the application of a hot or cold pack to the tip of the docked tail or the corresponding region of the intact tail (Eicher et al., 2006). In response to cold stimulus, docked heifers demonstrated their discomfort by increasing the frequency of foot stomps (Eicher et al., 2006). This response may also be an indication of hyperalgesia, which is an increased sensitivity to pain due to nerve fibers (Eicher et al., 2006). In response to the hot pack, intact heifer shifted more than the docked heifers suggesting that analgesia may have occurred (Eicher et al., 2006). Analgesia refers to the decreased sensitivity to heat resulting from chronic pain (Eicher et al., 2006). In both treatments, the under surface was warmer than the tip of the docked tail and — after testing this area — tended to be warmer than the intact counterpart (Eicher et al., 2006). This temperature difference may indicate an increase in blood flow, which would be consistent with neuropathic pain (Eicher et al., 2006). This result would be consistent with unreported data from the Eicher lab, which detailed neuromas (masses of nerve tissue at the endpoint of an amputation) in the tips of the docked tails (Eicher et al., 2006). Finally, the increased surface temperatures are consistent with the reports of phantom limb pain in human amputees, which suggests a similar mechanism may be operating in both (Eicher et al., 2006).

Factors Not Affected by Tail Docking

Behavior during Tail Docking Procedures

One of main reasons that tail docking was considered a welfare concern is the acute pain experienced during the docking procedure. Recent work has evaluated the pain response of calves (Eicher and Dailey, 2002; Schreiner and Ruegg, 2002b), heifers (Eicher et al., 2000; Schreiner and Ruegg, 2002b) and lactating cows (Tom et al., 2002) during the period immediately after the application of the docking apparatus.

Calves undergoing tail docking displayed more behaviors indicative of restlessness, which could be interpreted as a signal of discomfort (Eicher and Dailey, 2002; Schreiner and Ruegg, 2002b). In the study by Eicher and Dailey (2002), the docked calves were observed lying less and walking more. These calves also directed their heads towards their tails at a rate

eight times greater than the non-docked controls (Eicher and Daily, 2002). Similarly, when restlessness was defined as a change in posture, calves banded at an age greater than 42 days old were observed to be more restlessness than the non-docked controls one, eight and nine days after the banding (Schreiner and Ruegg, 2002b).

The same parameters were used to evaluate behavior of heifers (defined as 2 to 4 months before first parturition by Schreiner and Ruegg (2002b) or 1 month before first parturition by Eicher et al. (2000)) during the initiation of tail docking. Schreiner and Ruegg (2002b) observed no behavioral changes in response to tail docking by banding. The heifers involved in the study by Eicher and Daily (2002) increased the time they spent feeding following the application of the band and decreased the time they spent feeding when the necrotic tail was removed on day 6.

In lactating cows, minimal changes in behavior were observed (Tom et al., 2002). During the first six days following the onset of the docking procedure, intact cows held their tailed more in the raised position (day 0) and more in the resting posture (day 6; Tom et al., 2002). Control cows (intact without anesthetic) swung their tails more than intact with anesthetic, docked without anesthetic, or docked with anesthetic immediately after the application of the band (Tom et al., 2002). Finally, dry matter intake did not differ among any of the treatment during the trial (Tom et al., 2002).

Physiological Response

Despite the behavioral changes and indications of chronic pain, neither heifers (Schreiner and Ruegg, 2002) nor cows (Eicher et al., 2001) had serum cortisol concentrations that would suggest a stress response.

International Outlook on Tail Docking

Tail docking has been banned by Denmark, Germany, Scotland, Sweden and the United Kingdom (Stull et al., 2002). The outlook for tail docking was also found to be potentially negative in New Zealand, which is credited for starting the practice. In a survey cited by Stull et al. (2002), 60 percent of the general public and 53 percent of nondairy farmers considered tail docking to be an animal welfare concern. Additionally, tail docking in New Zealand must be done by a veterinarian. Although it is technically legal in some Australian states, tail docking must be done for udder health reasons under the recommendation of a veterinarian (Stull et al., 2002). Finally, Canadian guidelines allow for tail docking, but recommend that it be conducted as early in life as possible and with the proper precautions to alleviate pain (Stull et al., 2002). The Canadian Veterinary Medical Association has issued a statement opposing the use of tail docking as part of the routine management of dairy cows (CVMA, 2003).

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