

Technical staffs' knowledge and attitudes survey regarding tail docking on dairy farms of Turkey

Çağrı Çağlar SİNMEZ^{1*}, İsmail ÜLGER², Gökhan ASLIM³, Ali YİĞİT⁴, Mahmut KALİBER⁵

¹Department of History of Veterinary Medicine and Deontology, Faculty of Veterinary Medicine, Erciyes University, Kayseri, Turkey

²Department of Animal Science, Faculty of Agriculture, Erciyes University, Kayseri, Turkey

³Department of History of Veterinary Medicine and Deontology, Faculty of Veterinary Medicine, Selçuk University, Konya, Turkey

⁴Department of History of Veterinary Medicine and Deontology, Faculty of Veterinary Medicine, Kafkas University, Kars, Turkey

⁵Department of Animal Science, Faculty of Agriculture, Erciyes University, Kayseri, Turkey

Received: 18.03.2021

Accepted/Published Online: 22.07.2021

Final Version: 25.08.2021

Abstract: The study examined the knowledge, beliefs, and attitudinal drivers of technical staff and breeders regarding tail docking and the incidence of docking on large-scale dairy farms (≥ 100 cattle) in Turkey. Survey responses were analyzed using the Mann–Whitney U test to determine attitudinal differences between respondents who self-reported docking tails or not docking their cattle. Using face-to-face interviews of 210 respondents at 206 Turkish dairy farms was carried out. Tail docking procedures were practiced on 27.1% of the surveyed farms. At the time of the tail docking, 57.9% of cattle were less than 12 months of age. The most frequent tail docking method was amputation by rubber ring constriction (61.4%), with the following most common method being a surgical one (33.3%). The most preferred location for the tail docking was between the sixth and seventh coccygeal vertebrae (29.8%), followed by level with midudder (26.3%). The most common reasons given by respondents for docking tails were to increase hygiene (64.8%), the comfort of the workers (62.4%), and reduce the risk of mastitis (60.9%). The survey results of the present study indicated that, without clear regulations or laws, the tail docking of dairy cattle varies substantially with personal preference rather than scientific justification in Turkey. Technical staff and breeders should be educated and been aware of humane alternative methods (switch trimming) for tail docking in dairy cattle, and societal pressure and public perceptions considered about tail docking on Turkish dairy farms.

Key words: Animal welfare, dairy farms, farm management, tail docking, technical staff attitudes

1. Introduction

Laws and policies on animal welfare have been arranged based on scientific studies and demands from animal owners, animal rights organizations, consumers, and the public. In the United States of America (USA), the public thinks that the welfare of dairy cattle is a concern [1]. In this respect, scientists, farmers, and the public in recent years have debated on the practice of dairy cattle tail docking and its effect on the health, welfare, and general wellbeing of the animals [2].

Tail docking of dairy cattle is practiced in many countries around the world, including the present study in Turkey, for similar beliefs, namely faster and more efficient milking and better-quality milk for the consumers. For veterinarians and breeders, other perceived benefits of tail docking are reduced risks of diseases like leptospirosis and mastitis, fewer flies for the cow, improved cow hygiene, and reduced exposure to manure and mud [3–9]. However, the tail docking of dairy cattle is not welcomed by some

viewers because of scientific and ethical issues about the procedure, which involves mutilation of cattle, acute and chronic pain, infection in tail stumps, interference of cow's social communication ability, and aberrant grazing behavior. It was also reported that the procedure attracts swarms of flies, decreases milk production due to the alteration of eating patterns, and causes restless behavior [6,7,10–16].

An online national survey in the USA indicated that 1201 respondents regarded tail docking as the least beneficial and the most harmful act for dairy cattle welfare [2]. Weary et al. [9] noted that some survey respondents of cattle producers, veterinarians, teachers, students, and industry professionals considered tail docking as “unnatural” because of a reduced ability of the cow to disperse flies.

There are conflicting laws in Turkey regarding the tail docking of animals. Pet animals are not allowed to be tail-docked for aesthetic purposes based on the “Animal

* Correspondence: cagribey6038@hotmail.com

Protection Law”, act 5199¹. However, there is no clear-cut law prohibiting tail docking in dairy cattle [17] except for regulation on organic farming². Neither are there any prohibitive provisions on regulations on the welfare of farm animals³. With all the conflicting laws, tail docking of dairy cattle has been increasingly practiced [18].

Valros et al. [19] stressed the importance of listening to farmers to fully understand their issues and strengthen the contact between science and end-users. The awareness of farmer actions and the values and attitudinal factors behind docking tails is a growing and essential field of animal welfare research [20]. The objectives of the present work were to investigate background factors, underlying beliefs, and attitudes, which influence the tail docking of cattle (lactating cows, heifers, calves) by technical staff on large-scale dairy farms, to document the reasons for tail docking in dairy cattle, and to evaluate the effect of tail docking on cattle welfare in Turkey.

2. Materials and methods

The population of the study consisted of technical staff and breeders, who perform tail docking on dairy farms and/or have knowledge about tail docking on large-scale dairy farms (≥ 100 cattle/farm). We did a cross-sectional study of tail docking in dairy farms randomly selected based upon their accessibility in cities (Konya, Kayseri, Samsun, Tokat, Kahramanmaraş, Adana, Gaziantep, Şanlıurfa, Kars, Erzurum, Bursa, Balıkesir, İzmir, Manisa) in each of the seven geographical regions of Turkey, namely Mediterranean, Eastern Anatolia, Aegean, South-eastern Anatolia, Central Anatolia, Black Sea, and Marmara (Figure 1). We interviewed the individuals responsible for the process of docking at the dairy farms including veterinarians and technicians.

According to data obtained from the Republic of Turkey Ministry of Agriculture and Forestry⁴ on February 1, 2016, the total number of large-scale dairy farms that constituted the main mass of the study was determined as 4142. The sample numbers were determined based on the method reported by Krejcie and Morgan [21].

$$S = X^2 N P (1 - P) \div d^2 (N - 1) + X^2 P (1 - P).$$

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be .83 since this would provide the maximum.

Sample size).

D = the degree of accuracy expressed as a proportion (.05).

With the method mentioned above, it was planned to interview technical staff continuously on 206 dairy farms with a 95% confidence interval, and the proportional stratified sampling technique was used to determine the sample distribution. During the fieldwork, 210 respondents agreed to fill out the forms from 206 farms, and filled forms were evaluated.

2.1. Survey

The interviews were conducted with face-to-face surveys from June 15 to October 15, 2017. The questions of the survey were adapted from Barnett et al. [3]. Respondents were encouraged to share their views and experiences, and each conversation lasted about 45 min. Two veterinarians, with more than 15 years of qualitative research experience and two animal scientists coordinated the respondents.

The survey consisted of 25 questions related to tail docking for both factual and attitudinal data in two different sections (see Appendix for the list of questions). The questions in the first section were demographic, including a description of the employee with age, sex, education level, occupation, and the number of years working in dairy farms. The second part of the survey contained four closed-ended questions, two open-ended questions, and 13 Likert-scale questions (1–5 scale) on judgments of tail-docking actions with all attitudinal variables. Responses were recorded with a Likert numerical scale with “1 = strongly agree”, “2 = somewhat agree”, “3 = neither agree nor disagree”, “4 = somewhat disagree”, or “5 = strongly disagree”. The respondents were asked if they had any additional remarks at the end of the interview.

2.2. Statistical analysis

The SPSS v. 25.0 statistics package program was used for the data analysis. The Mann–Whitney U test was used to evaluate attitudinal differences between respondents who self-reported docking tails (TD+) or not docking their cattle (TD-). Tables with statistically significant analysis results are included in the “Results” section. Differences where the P-value was < 0.05 were deemed statistically significant.

¹ Official Gazette (2004). Animal Protection Act [online]. Website <https://www.tbmm.gov.tr/kanunlar/k5199.html/> [accessed 15 July 2019].

² Official Gazette (2010). Regulation on the Implication of Organic Agriculture [online]. Website <https://www.resmigazete.gov.tr/eskiler/2010/08/20100818-4.htm> [accessed 15 July 2019].

³ Official Gazette (2014). Regulation on General Provisions Regarding Welfare of Farm Animals [online]. Website <http://www.resmigazete.gov.tr/eskiler/2014/11/20141122-6.htm/> [accessed 15 July 2019].

⁴ TURKVET (2016). Animal Registration System. Republic of Turkey Ministry of Agriculture and Forestry Information System [online]. Website <https://hbs.tarbil.gov.tr/> [accessed 1 February 2016].

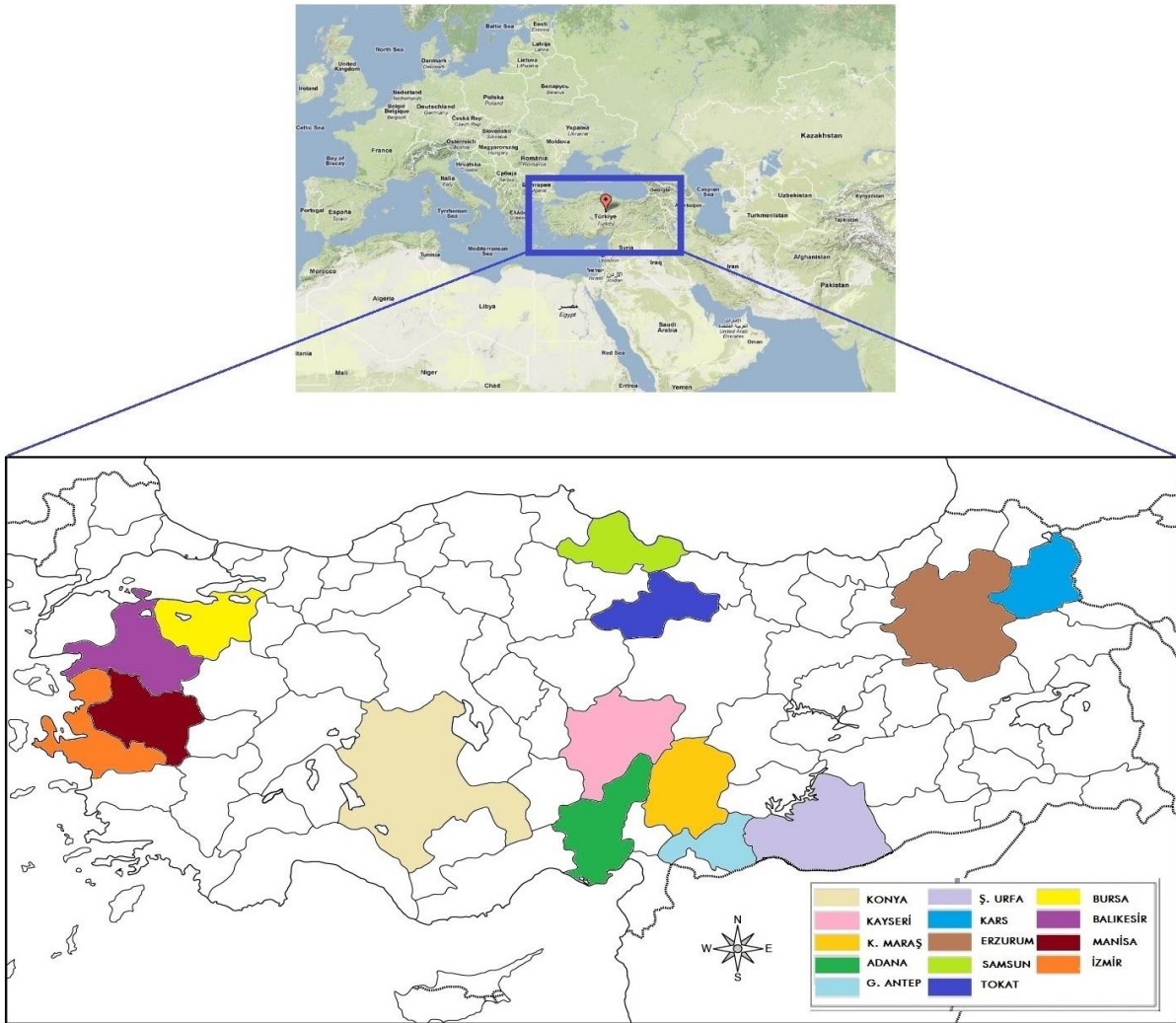


Figure 1. Study area.

3. Results

The demographic details of the respondents are presented in Table 1. About half of the respondents (50.5%) were aged 28-37, and the sex of the respondents was mainly male (96.7%), with a small proportion of women (3.3%). Most of the respondents were veterinarians (78.6%) and the rest of the occupational groups constituted 21.4%. Of the 210 respondents, 31.4% of them had 1–5 years of work experience, 31% had 6–11 years of work experience, and only 3.3% had 24 years or more work experience.

In the present study, tail docking procedures were practiced on 27.1% of the dairy farms. 57.9% of the cattle were less than 12 months of age when the tails were docked. The most frequently used method of tail docking was amputation by rubber ring constriction (61.4%), and the single most frequent physical place for tail docking was between the sixth and seventh coccygeal vertebrae (29.8%) (Table 2).

Tail docking practice data were evaluated for statistically significant differences ($p < 0.001$). Beliefs of the respondents, who dock or do not dock cattle tails, statistical values respondents' opinions, and frequency of docking are given in Tables 3 and 4.

The responses, from large dairy cow workers, who docked tails or did not dock their cattle, to a variety of problems that could be linked to docking were evaluated. Some very strong variations in responses were found. For example, the scores given by respondents show that those, who docked their cows considered the practice very important for milk quality, was statistically higher than those who did not dock. Similarly, respondents who docked tails thought that docking reduced the risk of leptospirosis for employees, cow mastitis was lower, milk quality was higher, employee comfort was higher, cow hygiene was increased, and it was more convenient for artificial insemination practices, compared to those

Table 1. Demographic details of the respondents

		n	%
Age	18–27	45	21.4
	28–37	106	50.5
	38–47	50	23.8
	48 and older	9	4.3
Sex	Male	203	96.7
	Female	7	3.3
Occupation	Technician (Junior College)	10	4.8
	Technician (High School)	4	1.9
	Worker	3	1.4
	Veterinarian	165	78.6
	Zootechnician	20	9.5
	Breeder	8	3.8
Professional experience	1–5 years	66	31.4
	6–11 years	65	31.0
	12–17 years	51	24.3
	18–23 years	21	10.0
	24 years or more	7	3.3

respondents that did not dock tails. Respondents who dock cattle tails thought that docking causes cow restlessness, and methods of docking tail cause less pain in cows were lower than those who did not dock cattle tails ($p < 0.001$, Table 3).

While there were no statistical differences, the answers of respondents to open-ended questions were also evaluated in the present study. Respondents that docked their cows' tails considered that the practice could avoid the tail from being caught in farm equipment or ending up with the tail being ruptured (or damaged) ($n = 13$), and that it would prevent the tail from freezing during harsh winter conditions ($n = 14$). Besides, respondents thought that the practice saves energy by preventing movement of the tail ($n = 17$).

4. Discussion

Tail docking practices were applied to 51.7% of calves by the age of 6 months in North Central and North-eastern USA dairy farms [8], and to 33.3% of dairy cattle in general in the USA⁵. The age of tail docking in dairy cattle of Victorian dairy farms ranged from 1 to 43 months with an average of 18 months [3]. However, the percentage of dairy cattle with docked tails at the same age (by 6 months) in Turkey, as reported in the present study, is less than (29.8%) of the percentage reported in the USA. The

Table 2. Information about tail docking

		n	%
Is tail docking done?	Yes	57	27.1
	No	153	72.9
Age at docking	0–5 mo	17	29.8
	6–11 mo	16	28.1
	12–17 mo	11	19.3
	18–23 mo	3	5.3
	24 mo and older	10	17.5
Docking method	Rubber ring	35	61.4
	Surgical	19	33.3
	Both	3	5.3
Length of docked tail	Above the top of the udder	7	12.3
	Level with the top of the udder	5	8.8
	Level with mid udder	15	26.3
	6–7th vertebrae	17	29.8
	Under the vulva	13	22.8

tail docking of dairy cattle ages six months to 2 years was reported as 13.1%–21.5% in the USA [8]. The reported values are much lower than the numbers reported here (52.7%) for the same age range of dairy cattle in Turkey. Tail docking of dairy cattle at the age of 2 years and older was 17.5% in the present study compared with 35.2% in North Central and North-eastern USA dairy farms [8] and 25.5% in the USA in general⁵.

The amount of tail removed from the cattle changes with cultural and personal preferences. In the present work, tail docking was most frequently applied to the spot between the sixth and seventh coccygeal vertebrae of the tail (29.8%) and the level of the mid udder (26.3%). The tail docking process is recommended for locations at the distal to the sixth coccygeal vertebra, leaving the tail not too short for proper restraint nor too long to allow manure contamination of the urogenital tract (vulvar lips) [6]. Tail docking of dairy cows in Australia is most frequently performed at the tip of the teats (54%) and mid udder level (23%) [3].

Using rubber rings for tail docking of dairy cattle was more common (61.4%) when compared with the surgical method (33.3%) in the present study. Similar results were reported in dairy farms of North Central and North-eastern USA (92.5%) [8] as well as in the USA general cattle population (95.9%)⁵. Results similar to the present study, were also reported [3] in Australia, as the dairy cattle tail docking method mostly uses rubber rings (75%). The surgical method is also common among the results from

⁵ United States Department of Agriculture (2018). USDA-Dairy 2014, Health and Management Practices on U.S. Dairy Operations, 2014. Fort Collins, CO [online]. Website https://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy14/Dairy14_dr_PartIII.pdf/ [accessed 10 July 2019].

Table 3. Beliefs of respondents, who docked or did not dock cattle tails with statistical values.

Tail docking (TD)	GROUPS								Test statistics	
	TD+				TD-					
	M	Q ₁	Q ₃	MR	M	Q ₁	Q ₃	MR	z	p
Tail docking is important for milk quality	3.0	4.0	4.0	132.0	3.0	2.0	4.0	95.6	3.964	<0.001
Tail docking is important for the stability of the animal	2.0	4.0	3.0	116.0	2.0	2.0	3.0	101.6	1.572	0.116
Tail docking is important for the comfort of employees	4.0	5.0	4.0	130.8	4.0	3.0	4.0	96.1	3.834	<0.001
Tail docking is important in reducing the risk of mastitis	3.0	5.0	4.0	123.6	4.0	3.0	4.0	98.7	2.752	0.006
Tail docking is important in increasing general hygiene	4.0	5.0	4.0	135.2	4.0	3.0	4.0	94.4	4.519	<0.001
Tail docking provides convenience in artificial insemination practices	2.0	4.0	4.0	126.6	3.0	2.0	4.0	97.6	3.158	0.002
Docking tails causes restlessness in cows	2.0	4.0	3.0	90.7	4.0	3.0	4.0	111.0	2.233	0.026
Tail docking reduces the risk factor of leptospirosis in employees	2.0	4.0	3.0	118.4	3.0	2.0	3.5	100.7	1.964	0.049
Tail docking reduces the number of flies	1.0	3.0	2.0	114.2	2.0	1.0	3.0	102.3	1.332	0.183
The methods of tail docking with a rubber ring and/or surgery cause the least pain in animals	2.0	4.0	3.0	89.1	3.0	2.0	4.0	111.6	2.464	0.014
The methods of tail docking with a rubber ring and/or surgery cause the short duration of (acute) pain in animals	2.5	4.0	4.0	98.5	4.0	3.0	4.0	108.1	1.085	0.278
The methods of tail docking with a rubber ring and/or surgery cause the long duration of pain (chronic) in animals	2.0	3.5	2.0	97.8	3.0	2.0	3.0	108.4	1.178	0.239
Feed wastage is an issue in animals with docked tails	2.0	4.0	3.0	112.6	2.0	2.0	3.0	102.8	1.071	0.284

M: Median, Q₁: Quartiles 1, Q₃: Quartiles 3, MR: Mid Range, z: Mann Whitney U test.

the present work (32.3%), from the USA⁵ (2.1%–7.5%), and Australia (20%) [3].

Tail docking was practiced on 27.1% of Turkish dairy farms for the same reasons as reported by Fulwider et al. [8]. Attention to cow hygiene was the most common reason (64.8% in the present study vs. 73.5%), followed by operator comfort (62.4% in the present study vs. 17.4%), and reduction of the risk of mastitis (60.9% in the present study vs. 1.0%) in the USA, where tail-docking was observed on 82.3% of dairy farms [8]. Dairy farmers in Australia have 35% of their cattle tails docked because of faster milking, a lower risk of leptospirosis for the operator, and a reduced risk of mastitis for the cow. Tail docking is also thought to facilitate the handling of cows, reduce swarms of flies, and improve milk quality [3].

The dairy farm respondents considered tail docking as beneficial for the comfort of the operator and cows in the present study. However, several reports indicate that the tail docking procedure causes pain to the animals and results in behavioral and physiological changes [6,7,10–13,15,16,22]. Preventing the tail from contacting any part of the milking parlour and facilitating a fast exit

from the parlour may necessitate tail docking in cows [6]. This supports the argument of improved hygiene rather than operator comfort as the primary reason for docking tails [8]. Supporting this view, in the present study, the respondents who docked tails (TD+) stated that tail-docking increased hygiene (84.2%), which was higher than the respondents (TD+), who noted that it was for the comfort of the employees (77.2%). While both groups (TD+ and TD-) stated that docked tails could lead to significant comfort to employees and increased hygiene, respondents, who docked tails, were more definite and had stronger beliefs.

In the present study, 71.9% of respondents who docked tails (TD+) and 56.9% of respondents who did not dock tails (TD-) claimed that docked tails could reduce the risk of mastitis with statistical significance. However, 84.2% of the respondents, who docked tails, and 57.5% of those who did not dock tails, thought that tail docking was crucial for increasing the general hygiene of the cow. Although not scientifically validated, some dairy farmers think that tail docking causes a significant improvement in cow cleanliness⁶, related diseases, and udder hygiene [23].

⁶ American Veterinary Medical Association (2014). Welfare Implications of Tail Docking of Cattle [online]. Website <https://www.avma.org/resources-tools/literature-reviews/welfare-implications-tail-docking-cattle/> [accessed 10 July 2019].

Table 4. Respondents' beliefs about docking with frequency and percentages.

Tail docking (TD)		Strongly disagree		Somewhat disagree		Neither agree nor disagree		Somewhat agree		Strongly agree	
		n	%	n	%	n	%	n	%	n	%
Tail docking is important for milk quality	TD+	7	12.3	6	10.5	12	21.1	23	40.4	9	15.8
	TD-	31	20.3	45	29.4	38	24.8	30	19.6	9	5.9
	Total	38	18.1	51	24.3	50	23.8	53	25.2	18	8.6
Tail docking is important for the stability of the animal	TD+	10	17.5	14	24.6	17	29.8	12	21.1	4	7.0
	TD-	34	22.2	54	35.3	30	19.6	28	18.3	7	4.6
	Total	44	21.0	68	32.4	47	22.4	40	19.0	11	5.2
Tail docking is important for the comfort of employees	TD+	5	8.8	3	5.3	5	8.8	18	31.6	26	45.6
	TD-	19	12.4	16	10.5	31	20.3	63	41.2	24	15.7
	Total	24	11.4	19	9.0	36	17.0	81	38.6	50	23.8
Tail docking is important in reducing the risk of mastitis	TD+	5	8.8	4	7.0	7	12.3	20	35.1	21	36.8
	TD-	18	11.8	13	8.5	35	22.9	63	41.2	24	15.7
	Total	23	11.0	17	8.1	42	20.0	83	39.5	45	21.4
Tail docking is important in increasing general hygiene	TD+	2	3.5	5	8.8	2	3.5	21	36.8	27	47.4
	TD-	15	9.8	18	11.8	32	20.9	63	41.2	25	16.3
	Total	17	8.1	23	11.0	34	16.2	84	40.0	52	24.8
Tail docking provides convenience in artificial insemination practices	TD+	4	7.0	14	24.6	7	12.3	21	36.8	11	19.3
	TD-	32	20.9	38	24.8	32	20.9	40	26.1	11	7.2
	Total	36	17.1	52	24.8	39	18.6	61	29.0	22	10.5
Tail docking causes cow restlessness	TD+	6	10.5	10	17.5	16	28.1	18	31.6	7	12.3
	TD-	10	6.5	15	9.8	37	24.2	60	39.2	31	20.3
	Total	16	7.6	25	11.9	53	25.2	78	37.1	38	18.1
Tail docking reduces the risk factor of leptospirosis in employees	TD+	2	3.5	13	22.8	22	38.6	16	28.1	4	7.0
	TD-	18	11.8	41	26.8	56	36.6	29	19.0	9	5.9
	Total	20	9.5	54	25.7	78	37.1	45	21.4	13	6.2
Tail docking reduces the number of flies	TD+	16	28.1	21	36.8	11	19.3	8	14.0	1	1.8
	TD-	55	35.9	54	35.3	32	20.9	10	6.5	2	1.3
	Total	71	33.8	75	35.7	43	20.5	18	8.6	3	1.4
The methods of tail docking with a rubber ring and/or surgery causes the least pain in animals	TD+	7	12.3	17	29.8	13	22.8	16	28.1	4	7.0
	TD-	13	8.5	26	17.0	38	24.8	49	32.0	27	17.6
	Total	20	9.5	43	20.5	51	24.3	65	31.0	31	14.8
The methods of tail docking with a rubber ring and/or surgery cause the short duration of (acute) pain in animals	TD+	5	8.8	9	15.8	13	22.8	26	45.6	4	7.0
	TD-	12	7.8	11	7.2	44	28.8	67	43.8	19	12.4
	Total	17	8.1	20	9.5	57	27.1	93	44.3	23	11.0
The methods of tail docking with a rubber ring and/or surgery cause the long duration of (chronic) pain in animals	TD+	10	17.5	22	38.6	11	19.3	11	19.3	3	5.3
	TD-	16	10.5	47	30.7	63	41.2	18	11.8	9	5.9
	Total	26	12.4	69	32.9	74	35.2	29	13.8	12	5.7
Feed wastage is an issue in animals with docked tails	TD+	10	17.5	12	21.1	17	29.8	16	28.1	2	3.5
	TD-	26	17.0	51	33.3	44	28.8	14	9.2	18	11.8
	Total	36	17.1	63	30.0	61	29.0	30	14.3	20	9.5

* 5-point Likert scales was used in the study.

Schreiner and Ruegg [5] and Stull et al. [6] showed that udder hygiene scores, somatic cell counts, and incidence of mastitis were similar between dairy cows with docked tails and intact cows. Lombard et al. [24] also found that in farms that did not tail dock cows, hygiene was higher compared to those that did (5.7% vs. 8.8% were dirty) and in farms located in the western area of the sample compared to those located in the eastern region (5.2% vs. 9.7% were dirty). Tucker et al. [12] similarly found that tail-docked cattle had a higher incidence of mastitis without statistical significance. Another study conducted in 3 Kentucky dairy herds in the USA on 206 lactating dairy cows revealed no significant differences in cow cleanliness scores and teat cleanliness scores among docked, switch-trimmed, or switch-intact cows [25]. Ingle et al. [26] emphasized that cleanliness, barn floor, barn design, and environmental hygiene, as well as other management factors, were extremely important in protecting udder hygiene. Based on the evidence given by Ingle et al. [26], it makes no sense that participants of docking continue to cite improved cow hygiene and reduced risk of mastitis as the only reasons for docking. Tail docking is not justified when considering many other factors influencing udder hygiene and the cow rather than the tail itself. Therefore, the benefit of tail docking in cattle is lacking scientific evidence.

In the present study, 55.2% of the total respondents agreed with the statement that tail docking causes restlessness in cows. Respondents, who did not dock their cows (TD-), stated that tail docking results in restlessness (59.5%) and were a higher percent than the respondents who docked tails (43.9%). Parallel to the results of the present study, Petrie et al. [27] observed that tail docking in cows caused symptoms of restlessness. Comparably, Schreiner and Ruegg [28] pointed out that a certain degree of restlessness, though not statistically significant, occurred in docked heifers in the first hour after application of the rubber rings. The survey of the present work found more restlessness in pre-weaned calves docked at 22 to 42 days old compared to calves not tail docked at the same age.

Pain is one of the major concerns about the tail docking procedure in cattle. Although experimental measurement of pain in animals is not precisely possible, Eicher et al. [29] reported that tail docking using rubber rings resulted in mild pain for cows. Similarly, tail docking has been shown to cause acute pain as well as irritation brought about by swarms of flies on the docked tail [30]. Tom et al. [14] found that besides mild pain, there were no behavioral changes, restlessness, or any changes in milk production and feed intake in cows docked with or without using anesthetic agents. The authors [14,22] also found that there was no clear evidence that the use of epidural anesthesia or performing the procedure at younger ages reduced the pain response in tail docking. However, it has been reported that tail-docked cattle experience clostridial diseases, such

as gangrene and tetanus [6] as well as nerve damage and neuroma formation, all of which create chronic pain in the tail of cattle [15,31]. Troncoso et al. [32] observed an elevated response to mechanical stimulation caused by lower pain pressure thresholds and a positive association to pinprick sensitivity in tail docked cattle, suggesting that tail docked cows in the long-term could suffer from chronic pain. Edwards and Bennett [23] found that the animals would experience some degree of acute pain and distress at the time of the procedure and medium-term pain arising from tissue damage, with longer-term chronic pain afterward. In accordance with reported results in the literature [6,14,15,23,29–32], the present work also showed that respondents (both TD+ and TD-) tended to agree that the method used to dock in cattle caused mild pain (45.8%) or acute pain (55.3%). However, contrary to the reports from the literature, the respondents (TD+) disagreed that tail docking resulted in chronic pain in cattle (56.1%). Although chronic pain after docking procedures is a major concern, the degree and duration of chronic pain were not investigated in the present study.

In the present study, beliefs about the statement tail docking reduces the risk factor of leptospirosis in employees showed significant differences. 35.1% of the respondents (TD+) considered that tail docking is important in terms of reducing the risk of leptospirosis, whereas 38.6% of them were unsure. While 38.6% of the respondents considered the practice unimportant in terms of reducing the risk of leptospirosis, 36.6% of them were unsure. Tail docking is a way of decreasing the risk of leptospirosis by removing the urine-soaked tail from being in contact with the milker's skin or face⁵. However, Mackintosh et al. [33] stated that transmission of leptospirosis in endemic herds occurred through various factors other than tail contacts. Therefore, vaccination against leptospirosis would offer a solution to the post-procedural complications of tail docking and would additionally protect the farm crew from the transmission of the disease [6]. We can claim that our survey results support Stull's [6] approach to this disease. In this context, vaccination programs should be implemented to eliminate tail docking in terms of this disease and to provide training activities to inform technical staff about the disease.

The swishing of the tail in horses and cows is a means of controlling flies around the hind legs. Therefore, more flies cluster around the hind legs of tail-docked cows when compared with intact cows, as stated by many researchers [10,11,13]. The possibility of being infected with insect-borne diseases and discomfort increase with the incapability of removing biting flies with an animals' tail [23]. Tail docked cows are more vulnerable to flies and this loss of the ability to get rid of flies is an issue in animal welfare [10]. However, dairy farmers in countries such as Australia prefer tail docking for reducing the fly invasion

on cows [3]. Although there was no statistically significant association between the two groups of respondents, 64.9% of the respondents (TD+), and 71.2% of the respondents (TD-) thought that tail docking does not reduce the numbers of flies on cows, contrary to the results of the study by Barnett et al. [3]. There is no precise scientific evidence that tail docking reduces the number of flies on cows.

Miller [34] reported that cow owners in Michigan docked 50% of the cows' tails as they arrived on the farm to reduce lameness and tail injuries as well as increase animal performance. In accordance with the results of Miller's work [34], the respondents of the present study thought that the tail should be docked to prevent the tail from being ruptured when it is caught in farm equipment (cow brush and free stall manure cleaner) and to prevent the cow tail from freezing during harsh winter conditions.

The present study is the first report in the literature showing that 56.1% of respondents (TD+) reported that tail docking provides convenience in artificial insemination, while 45.7% of the respondents (TD-) disagreed that the practice provides convenience in artificial insemination. Although no statistically significant association was identified, the present study also found that tail docking saves energy by preventing the movement of the tail. Another point was waste of feed as the tail docked cows try to avoid flies by blowing feed at them using their mouths. While there was low agreement that docking tails would cause feed waste among the respondents (23.8%), a higher percentage of respondents believed that the practice would not cause feed waste (47.1%). Even though both groups (TD+ and TD-) stated that docked cows would not cause feed waste, respondents who did not dock tails had stronger beliefs (50.3%).

Tail docking is not recommended by the World Organisation for Animal Health (OIE) because it does not increase the health or welfare of dairy cattle⁷. According to the European Council Regulation EC No 889/2008⁸ (article 18), attaching elastic bands to sheep's tails and for farm animals of tail-docking, cutting teeth, trimming beaks, and dehorning are forbidden in organic farming. Any of these operations, however, may be approved by the competent authority for the sake of health, safety or hygiene of the farm animals. Tail docking in dairy cattle is prohibited in several European countries, some states in the USA, such as California [9], some provinces of Canada⁹, and some Australian states with the exception of a veterinarian's recommendation for udder health. The tail docking procedure should only be performed by the rubber ring method in New Zealand [6]. Besides, The National Milk Producers Federation's Farmers Assuring

Responsible Management (FARM) program alerted their members that beginning on January 1, 2017, in the USA, there would be an organizational call to reduce or ban tail-docking practices and non-compliant members would be suspended⁵.

However, legitimate tail docking of cattle is not clear in Turkey. According to the "Animal Protection Law" (law number: 5199), pet animals cannot be tail-docked for aesthetic purposes. There is no precise Turkish law prohibiting tail docking in cattle¹. However, tail docking in cattle can be considered forbidden based on the interpretation of the substance of the law stating that "any parts or whole organs or tissues of live animals cannot be removed or destroyed with the exception of for medical purposes". In addition, regulations regarding the welfare of farm animals provide that farm animals cannot be surgically or otherwise altered, except for medical treatment³.

5. Conclusion

New information on the incidence of tail docking on dairy farms and their practices was provided by this survey. The survey results of the present study indicated that without clear regulations or laws, the tail docking of dairy cattle and related questions concerning the age of the animals, methods used, and benefits derived will vary greatly according to personal preference (with the anthropocentric approach) rather than scientific justification in Turkey.

Tail docking practices in Turkey should be considered an issue of animal welfare. There should be clear-cut laws and regulations in keeping with the advancements in animal welfare and animal rights, as applied in other parts of the world. This should make technical staff and breeders stop the practice of tail docking in cows.

Technical staff and breeders should be educated and made aware of humane alternative methods (switch trimming) for tail docking in dairy cattle, societal pressure, and public perceptions considered about tail docking on Turkish dairy farms. In the formulation of intervention strategies, these factors must be considered and addressed to influence the change of practice, to enhance cattle welfare.

Acknowledgments

This research was supported by the Erciyes University, Scientific Research Projects Office (project number TSA-2016-6671) and was orally presented at the International Congress on Agriculture and Animal Sciences in Alanya, Turkey, 07–09 November 2018.

Conflict of interest

No potential conflict of interest is reported by the author(s).

⁷ World Organisation for Animal Health (2019). OIE- Terrestrial Animal Health Code. [online]. Website https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_aw_dairy_cattle.pdf [accessed 25 April 2020].

⁸ Official Journal of the European Union (2008). European Commission Regulation EC No 889/2008 [online]. Website <https://eurlex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:32008R0889&from=EN> [accessed 25 April 2020].

⁹ National Farm Animal Care Council (2009). Code of Practice for the Care and Handling of Dairy Cattle [online]. Website http://www.nfacc.ca/pdfs/codes/dairy_code_of_practice.pdf/ [accessed 10 July 2019].

References

1. Wolf C, Tonsor GT, McKendree MGS, Thomson DU, Swanson JC. Public and farmer perceptions of dairy cattle welfare in the United States. *Journal of Dairy Science* 2016; 99: 1-12. doi: 10.3168/jds.2015-10619
2. Widmar NO, Morgan CJ, Wolf CA, Yeager EA, Dominick S et al. US resident perceptions of dairy cattle management practices. *Agricultural Sciences* 2017; 8: 645-656. doi: 10.4236/as.2017.87049
3. Barnett JL, Coleman GJ, Hemsworth PH, Newman EA, Fewings-Hall S et al. Tail docking and beliefs about the practice in the Victorian dairy industry. *Australian Veterinary Journal* 1999; 77 (11): 742-747. doi: 10.1111/j.1751-0813.1999.tb12919.x
4. Halverson M. Tail docking dairy cattle. *Animal Welfare Institute Quarterly* 2002; 51 (4): 18.
5. Schreiner DA, Ruegg PL. Effects of tail docking on milk quality and cow cleanliness. *Journal of Dairy Science* 2002a; 85 (11): 2503-2511. doi: 10.3168/jds.S0022-0302(02)74333-6
6. Stull CL, Payne MA, Berry S, Hullinger PJ. Evaluation of the scientific justification for tail docking in dairy cattle. *Journal of the American Veterinary Medical Association* 2002; 220 (9): 1298-1303.
7. Ruegg PL. Tail docking and animal welfare. *The Bovine Practitioner* 2004; 38: 24-29.
8. Fulwider WK, Grandin T, Rollin BE, Engle TE, Dalsted N et al. Survey of dairy management practices on one hundred thirteen North Central and Northeastern United States dairies. *Journal of Dairy Science* 2008; 91 (4): 1686-1692. doi: 10.3168/jds.2007-0631
9. Weary DM, Schuppli CA, Von Keyserlingk MAG. Tail docking dairy cattle: responses from an online engagement. *Journal of Animal Science* 2011; 89: 3831-3837. doi: 10.2527/jas.2011-3858
10. Phipps AM, Matthews L, Rand Verkerk GA. Tail docked dairy cattle: fly induced behaviour and adrenal responsiveness to ACTH. *Proceedings of the New Zealand Society of Animal Production* 1995; 55: 61-63.
11. Eicher SD, Morrow-Tesch JL, Albright JL, Williams RE. Tail docking alters fly numbers, fly-avoidance behaviors, and cleanliness, but not physiological measures. *Journal of Dairy Science* 2001; 84 (8): 1822-1828. doi: 10.3168/jds.S0022-0302(01)74621-8
12. Tucker CB, Fraser D, Weary DM. Tail docking dairy cattle: effects on cow cleanliness and udder health. *Journal of Dairy Science* 2001; 84: 84-87. doi: 10.3168/jds.S0022-0302(01)74455-4
13. Eicher SD, Dailey JW. Indicators of acute pain and fly avoidance behaviors in Holstein calves following tail-docking. *Journal of Dairy Science* 2002; 85 (11): 2850-2858. doi: 10.3168/jds.S0022-0302(02)74372-5
14. Tom EM, Duncan IJH, Widowski TM, Bateman KG, Leslie KE. Effects of tail docking using a rubber ring with or without anesthetic on behavior and production of lactating cows. *Journal of Dairy Science* 2002a; 85 (9): 2257-2265. doi: 10.3168/jds.S0022-0302(02)74305-1
15. Eicher SD, Cheng HW, Sorrells AD, Schutz MM. Behavioral and physiological indicators of sensitivity or chronic pain following tail docking. *Journal of Dairy Science* 2006; 89 (8): 3047-3051. doi: 10.3168/jds.S0022-0302(06)72578-4
16. Ventura BA, Cronney CC. To meet the ethical imperative of telos in modern dairy production: societal concern for naturalness, animal welfare, and opportunities for resolution through science. In: Engle T, Klingborg DJ, Rollin BE (editors). *The Welfare of Cattle*. 1st ed. USA: CRC Press, 2019. pp. 251-270.
17. Yaşar A. *Etik ve mevzuat yönüyle hayvan gönenci*. 1st ed. Konya, Turkey: Billur Press; 2017.
18. Sinmez ÇÇ, Yiğit A, Ülger İ, Yaşar A. Tail docking and ear cropping in ruminants: a comparison of welfare aspects in the world and Turkey. *Journal of Faculty of Veterinary Medicine Erciyes University* 2016; 13 (1): 58-69.
19. Valros A, Janczak AM, Rodenburg B, Nordgreen J, Boyle L. What do we know about the link between ill-health and tail biting in pigs? In: *Proceedings of the 53rd Congress of the International Society for Applied Ethology*; Bergen, Norway; 2019. pp. 290.
20. Serpell JA. Factors influencing human attitudes to animals and their welfare. *Animal Welfare* 2004; 13: 145-151.
21. Krejcie VR, Morgan WD. Determining sample size for research activities. *Educational and Psychological Measurement* 1970; 30: 607-610. doi: 10.1177/001316447003000308
22. Tom EM, Rushen J, Duncan IJH, Passillé de AM. Behavioural, health and cortisol responses of young calves to tail docking using a rubber ring or docking iron. *Canadian Journal of Animal Science* 2002b; 82: 1-9. doi: 10.3168/jds.S0022-0302(02)74305-1
23. Edwards S, Bennett P. Tales about tails: is the mutilation of animals justifiable in their best interests or in ours? In: Appleby MC, Weary DM, Sandoe P (editors). *Dilemmas in animal welfare*. 1st ed. Oxfordshire, UK: CABI Press, 2014. pp. 6-27.
24. Lombard JE, Tucker CB, Von Keyserlingk MAG, Koprul CA, Weary DM. Associations between cow hygiene, hock injuries, and free stall usage on US dairy farms. *Journal of Dairy Science* 2010; 93 (10): 4668-4676. doi: 10.3168/jds.2010-3225
25. Frantz LM, Morabito EA, Dolecheck KA, Bewley JM. Short communication: a comparison of cow cleanliness, fly population, and fly avoidance behaviors among docked, switch-trimmed, and switch-intact dairy cows in 3 commercial dairy herds. *Journal of Dairy Science* 2019; 102: 1584-1588. doi: 10.3168/jds.2018-14921
26. Ingle HD, Rice CA, Black RA, Childers SZ, Eberhart NL et al. Effect of switch trimming on udder and teat hygiene of dairy cows. *Journal of Applied Animal Welfare Science* 2018; 21 (3): 239-243. doi: 10.1080/10888705.2017.1393339

27. Petrie N, Stafford KJ, Mellor DJ, Bruce RA, Ward RN. The behaviour of calves tail docked with a rubber ring used with or without local anaesthetic. *Proceedings of the New Zealand Society of Animal Production* 1995; 55: 58-60.
28. Schreiner DA, Ruegg PL. Responses to tail docking in calves and heifers. *Journal of Dairy Science* 2002b; 85 (12): 3287-3296. doi: 10.3168/jds.S0022-0302(02)74417-2
29. Eicher SD, Morrow Tesch JL, Albright JL, Dailey JW, Young CR et al. Tail-docking influences on behavioral, immunological, and endocrine responses in dairy heifers. *Journal of Dairy Science* 2000; 83 (7): 1456-1462. doi: 10.3168/jds.S0022-0302(00)75017-X
30. Kroll LK, Grooms DL, Siegford JM, Schwehofer JP, Daigle CL. Effects of tail docking on behavior of confined feedlot cattle. *Journal of Animal Science* 2014; 92: 4701-4710. doi: 10.2527/jas.2014-7583
31. Fisher MW, Gregory NG. Reconciling the differences between the length at which lambs' tails are commonly docked and animal welfare recommendations. *Proceedings of the New Zealand Society of Animal Production* 2007; 67: 32-38.
32. Troncoso RH, Herzberg DE, Meneses CS, Müller HY, Werner MP et al. Mechanical/thermal sensitivity and superficial temperature in the stump of long-term tail-docked dairy cows. *Peer Journal* 2018; 6: 1-12. doi: 10.7717/peerj.5213
33. Mackintosh CG, Schollum LM, Blackmore DK, Marshall RB. Epidemiology of leptospirosis in dairy farm workers in the Manawatu. Part II: a case-control study of high and low risk farms. *New Zealand Veterinary Journal* 1982; 30: 73-76. doi: 10.1080/00480169.1982.34886
34. Miller SR. Survey of tail docking practices of Michigan livestock producers. Center for Economic Analysis Report. Michigan State University, USA: 2010. pp. 1-14.

Appendix

Survey of the evaluation of tail docking practices on dairy farms in turkey

Part 1

Demographic details

1. Age:
 - a) 18–27 b) 28–37 c) 38–47 d) 48–57 e) 58 and older.
2. Sex:
 - a) Male b) Female.
3. Education:
 - a) Primary school b) Secondary school c) High school d) University e) Postgraduate.
4. Occupation:
 - a) Technician (High School) b) Technician (Junior College) c) Worker d) Veterinarian e) Zootechnician f) Breeder.
5. Professional experience?
 - a) 1–5 years b) 6–11 years c) 12–17 years d) 18–23 years e) 24 years or more.
6. Do you dock tails on your dairy farm?
 - a) Yes b) No.

Part 2

Questions about tail docking

1. At what age range do you perform tail docking in your cattle?
 - a) 0–5 mo b) 6–11 mo c) 12–17 mo d) 18–23 mo e) 24 mo and older.

2. In which cattle breeds do you perform tail docking?
 - a) Holstein b) Simmental c) Montofon d) Domestic breed e) Others.

3. Which tail docking method do you use?

a) Rubber ring method.		
b) Surgical method (knife and scissors).		
c) Both methods (rubber ring and surgical).		
Other.....		

4. Where should the tail be docked?
 - a) Above the top of the udder.
 - b) Level with the top of the udder.
 - c) Level with the mid udder.
 - d) 6–7th vertebrae.
 - e) Under the vulva.

5. Indicate your decision about some of the questions given below with an (X) sign.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Tail docking is important for milk quality					
Tail docking is important for stability of the animal					
Tail docking is important for the comfort of the employees					
Tail docking is important in reducing the risk of mastitis					
Tail docking is important in increasing the hygiene in general					
Tail docking provides convenience in artificial insemination practices					
Tail docking causes restlessness in cows					
Tail docking reduces the risk factor of leptospirosis in employees					
Tail docking reduces the number of flies					
The methods of tail docking with a rubber ring and/or surgery cause the least pain in animals					
The methods of tail docking with a rubber ring and/or surgery cause short time (acute) pain in animals					
The methods of tail docking with a rubber ring and/or surgery cause long time (chronic) pain in animals					
Feed wastage is an issue in animals with docked tails					

6. What do you think are the advantages of tail docking?
 7. What are the disadvantages of tail docking in your opinion?