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A Path to Resolution Regarding the Show Lamb Tail Docking Controversy

Abstract
Short dock length in show lambs increases health risks and creates animal welfare concerns. The study reported here was conducted to 1) describe a population of lambs that were docked at the distal end of the caudal fold in terms of a linear measurement, and 2) determine the changes in tail length between docking, weaning, and market. A total of 782 lambs docked at the distal end of the caudal fold, comprised the population of lambs in the study. The results provide descriptive statistics to help guide industry leaders and Extension professionals concerned with docking standards at shows and sales.

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Introduction and Background

Lamb tail length at youth livestock shows is a contentious issue faced by many Extension professionals throughout the United States. At least five states have instituted statewide policies, and many county fairs have taken proactive positions on this issue. The study reported here was conducted to provide objective data upon which to base policy decisions and sound livestock show rules regarding this issue.

In recent years, many club lamb producers in the United States dock show lambs so that no tail remains. This popular practice is believed to create the appearance of a lamb with a more level rump and a fuller, squarer leg. Lambs with any tail are seen as having a distinct disadvantage at many sheep shows in the United States. Despite the common practice of complete tail removal, several U.S. sheep management references recommend dock lengths from 2.5 cm to 7.6 cm in young lambs (Williams, 1990; Battaglia, 1998; ASI, 2004).

Two major animal health organizations have passed resolutions recommending that lambs should be accepted for exhibition only if "tails are not docked shorter than the level of the distal end of the caudal fold" (USAHA, 1999; AVMA, 2000). These resolutions demonstrate that the recommended standard of docking at the distal end of the caudal fold (DECF) has broad support among animal health professionals.

When animal health professionals and the commercial sheep industry as a whole recommend one course of action on this issue and Extension in many states simply ignores it--there is a significant disconnect between industry practice and Extension recommendations. The authors of this article contend that this places Extension in an untenable position and thereby possibly jeopardizes its relevance.

One reason behind the recommendation against ultra-short docked lambs is the increased incidence of rectal prolapse observed in those animals. In a study of 1,245 lambs (Thomas et al., 2003), lambs docked at the DECF, mid-web, and with complete tail removal had rectal prolapse rates of 1.8%, 4.0%, and 7.8% respectively. Other factors were identified that influenced rectal prolapse in lambs, such as genetics ($h^2 = .14$), sex, and diet (pasture vs. concentrate in dry lot), but Thomas et al. (2003) identified tail length as a factor that could be easily changed to reduce the incidence of rectal prolapse.

The caudal fold is lost after docking, so it is difficult to establish an easily enforceable standard. Therefore it is critical to define the average length and standard deviations of lamb tails that have been docked at the DECF. This will provide a criterion that is robust and does not inadvertently penalize compliant producers. In addition to providing reasonable enforcement criteria, this information should also aid producers in selecting lambs at weaning.

Objectives

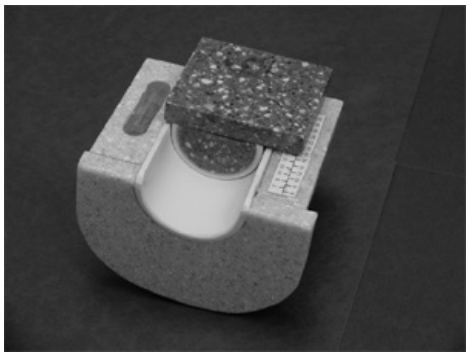
The three objectives of this study were to: 1) assess the accuracy of a device to measure lamb tail length, 2) describe a population of lambs docked at the DECF in terms of an average length and standard deviation, and 3) describe changes in tail length between docking, weaning, and market.

Materials and Methods

Several prototype measuring devices were tested before the final design was established. The DeTail Device (Figure 1) used to collect the data in the study has several unique features. A 5.08 cm inside diameter poly-vinyl chloride (PVC) pipe was longitudinally divided to form a trough 10.16 cm in length. A half-round, custom-made flange (extending 2.54 cm on the side and 5.08 cm below the PVC pipe) was attached by an epoxy-like material to the end of the PVC pipe that contacts the lamb's body. This flange was made from 1.27 cm thick, non-porous acrylic material. The flange is sized to make contact with the ischeal tuberosity (known commonly as the pin bones) on the lamb, and establish solid, repeatable points of contact to lessen measurement variations.

The second portion of the DeTail Device, made of slightly smaller (5-cm outside diameter) PVC pipe, acts as an index column and fits inside the main body of the device. With the DeTail Device in position and a lamb's tail resting in the main body, the index column is advanced within the main body of the Device until contact is made with the tail end. The appropriate mark on the scale on the side of DeTail Device is recorded. To fit the prevailing industry usage of the English System of Measurement in the United States, measurements were made on a tenth of an inch scale. All measurements have been converted to metric for reporting in this paper. The DeTail Device must be level during use. A small bubble level was mounted on the DeTail Device to achieve a level attitude. All DeTail Devices used to collect data were calibrated using a six-inch dial caliper that measured to 0.025 cm. All DeTail Devices were within a 0.05 cm tolerance.

Figure 1.
De-Tail Device Used to Collect Data for the Study



Accuracy of the Device

Three states collected data to assess and establish DeTail Device/rater accuracy. Ten lambs previously docked at the DECF and a variable number of raters (DeTail Device operators) were used at each location. Each rater had 10 lambs that had been docked at the DECF presented to them, one at a time. The lamb number was known only by the person recording measurements and was not known by the rater. Once the rater had measured all 10 lambs and measurements had been recorded for each lamb, the rater measured the 10 lambs again a second time in random order with no knowledge of the lamb identification numbers they were measuring. The rater had his or her back to the pen of lambs as someone else caught and presented each lamb to the rater. This process was carried out at each location.

Docking Process

A total of 782 lambs in five states comprised the population of lambs utilized to address research objectives 1 and 2 in the study: n= 782 at docking, n=713 at weaning, and n=652 at market weight. The change in numbers of the study population was due mainly to lambs that were marketed to locations outside the area and were unavailable for later measurements. All lambs were docked at the DECF at less than 2 weeks of age.

At all locations each lamb was restrained on its hindquarters with tail extended, in a position typically used for vaccinations and shearing. The lamb rested on a hard flat surface to aid in implementation of the procedure. A narrow tipped felt-tip pen was used to draw a line on the ventral side of the tail indicating the location of the DECF. The docking procedure was carried out exactly on this line drawn on the underside of the tail. If one caudal fold was shorter than the other, the line was drawn on the shorter of the two and the procedure was carried out at this location. In four of the five states, tails were taken off with either a burdizzo or hot iron. In one state lambs were docked with elastrator bands, and 1 week later tails were cut off with a knife and measurements made.

Measurement After Docking

After the tail was removed the lamb was returned to its feet. The DeTail Device was placed under the tail, with the tail contained in the trough lined with the PVC pipe as described above. The operator ensured that the DeTail Device's flange was in firm contact with the ischeal tuberosities and that the DeTail Device was held level. Then the index column was advanced into the DeTail Device until contact was made with the severed end of the tail. The graduated mark on the DeTail

Device that the distance indicator completely extended beyond was recorded. If the distance indicator was exactly on a graduated mark on the DeTail Device, that mark was recorded.

Measurement at Weaning and Marketing

All lambs in the study had the wool "slick-sheared" from the tip of the tail at weaning and market if there was sufficient wool on the end of the tail to interfere with measurement. The DeTail Device was used to measure the tail as described above.

Results

Accuracy of the Device

To establish the reliability of the measurement instrument and process, the test-retest method was used because it is important to establish the repeatability of an individual measuring the same lamb two or more times. This is important to the validity of the data collected in the study, but also to the procedure's credibility as it is carried out in a public setting such as a livestock show weigh-in.

The minimum, maximum, range, and mean of these measurements are summarized in Table 1 within the first or second measurement of an individual lamb. The 230 sets of paired measurements within a lamb across raters, locations, and lambs were not significantly different (P>.05) as determined by a paired sample t-test. The correlation between these paired measurements was r=.75 (P < .0001). The variation found in the descriptive data warranted additional tests. In the first of these, a paired sample t-test was used to determine if the 230 paired measurements of the sheep were statistically different. No significant difference was found t=1.31 (df 229, p=0.191).

Table 1.
Range and Means of Tail Length Measurements in cm by Individual Sheep for Research Objective 1

Sheep ID	Location	Measure	N	Range	Min	Max	Mean	SEM
1	STATE3	M1	7	0.7	3.3	4.0	3.63	0.132
	STATE3	M2	7	2.0	2.0	4.0	3.20	0.271
2	STATE3	M1	7	1.5	3.0	4.5	3.88	0.190
	STATE3	M2	7	0.7	3.3	4.0	3.70	0.109
3	STATE3	M1	7	2.7	2.5	5.3	4.32	0.363
	STATE3	M2	7	1.7	3.3	5.0	4.39	0.258
4	STATE3	M1	7	1.0	2.7	3.8	3.27	0.151
	STATE3	M2	7	1.5	2.0	3.5	2.98	0.213
5	STATE3	M1	7	2.2	2.2	4.5	3.70	0.287
	STATE3	M2	7	1.5	2.7	4.3	3.59	0.203
6	STATE3	M1	7	1.2	2.5	3.8	3.27	0.151
	STATE3	M2	7	1.2	2.5	3.8	3.12	0.173
7	STATE3	M1	7	1.5	4.0	5.5	4.976	0.220
	STATE3	M2	7	2.5	3.0	5.5	4.86	0.320
8	STATE3	M1	7	3.5	1.7	5.3	4.21	0.436
	STATE3	M2	7	1.7	3.0	4.8	3.92	0.214
9	STATE3	M1	7	1.5	4.3	5.8	5.15	0.205
	STATE3	M2	7	1.7	4.0	5.8	4.83	0.215
10	STATE3	M1	7	2.0	3.0	5.0	4.25	0.297
	STATE3	M2	7	2.2	2.5	4.8	3.74	0.358
11	STATE1	M1	10	2.7	4.0	6.8	5.87	0.342
	STATE1	M2	10	1.7	5.0	6.8	6.20	0.215
12	STATE1	M1	10	1.5	4.3	5.8	5.28	0.207
	STATE1	M2	10	2.5	3.5	6.0	5.13	0.280
15	STATE1	M1	10	2.0	3.0	5.0	4.17	0.201
	STATE1	M2	10	2.7	2.7	5.5	4.60	0.261
20	STATE1	M1	10	2.5	4.3	6.8	5.64	0.230

	STATE1	M2	10	2.0	4.8	6.8	5.56	0.209
23	STATE1	M1	10	2.0	3.8	5.8	5.13	0.189
	STATE1	M2	10	2.0	3.8	5.8	5.13	0.207
24	STATE1	M1	10	1.2	4.0	5.3	4.78	0.112
	STATE1	M2	10	2.0	4.0	6.0	4.88	0.185
25	STATE1	M1	10	2.5	3.5	6.0	4.83	0.260
	STATE1	M2	10	2.7	3.5	6.3	5.21	0.271
31	STATE1	M1	10	1.7	3.0	4.8	3.91	0.157
	STATE1	M2	10	2.0	2.7	4.8	3.81	0.204
32	STATE1	M1	10	2.0	4.0	6.0	4.90	0.265
	STATE1	M2	10	2.2	3.3	5.5	4.80	0.216
39	STATE1	M1	10	1.0	3.8	4.8	4.42	0.115
	STATE1	M2	10	2.0	2.7	4.8	4.17	0.237
61	STATE2	M1	6	0.2	3.8	4.0	3.85	0.042
	STATE2	M2	6	0.2	4.3	4.5	4.36	0.042
251	STATE2	M1	6	1.0	3.3	4.3	3.77	0.138
	STATE2	M2	6	1.5	2.7	4.3	3.60	0.240
541	STATE2	M1	6	0.7	3.0	3.8	3.47	0.126
	STATE2	M2	6	0.7	3.0	3.8	3.60	0.138
671	STATE2	M1	6	1.7	3.5	5.3	4.23	0.276
	STATE2	M2	6	0.7	3.5	4.3	4.06	0.114
691	STATE2	M1	6	0.5	2.7	3.3	3.18	0.087
	STATE2	M2	6	1.7	2.0	3.8	2.88	0.268
801	STATE2	M1	6	0.7	2.5	3.3	2.88	0.107
	STATE2	M2	6	0.7	2.5	3.3	2.92	0.109
802	STATE2	M1	6	0.5	2.7	3.3	2.96	0.107
	STATE2	M2	6	0.7	2.7	3.5	3.01	0.121
961	STATE2	M1	6	0.5	3.8	4.3	4.06	0.093
	STATE2	M2	6	0.7	2.7	3.5	3.13	0.156
1041	STATE2	M1	6	1.0	2.5	3.5	3.18	0.143
	STATE2	M2	6	0.7	3.0	3.8	3.51	0.138
1131	STATE2	M1	6	1.7	3.8	5.5	4.53	0.258
	STATE2	M2	6	1.0	3.8	4.8	4.40	0.169

Description of a Population of Lambs Docked at DECF

The mean tail length of the lambs in the study increased ($P < 0.01$) from 3.25 ± 0.03 cm at docking (n=782) to 4.09 ± 0.04 cm at weaning (n=713), and 4.54 ± 0.05 cm at market (n=652). Over 99% of the lambs in this study, docked at the DECF (as recommended by industry organizations), measured 1.77 cm or longer at market. Frequencies of measurements taken at docking, weaning, and market are shown in Table 2.

Table 2.
Frequency Table for Docking, Weaning, and Market Measurements

Measure cm	Measure 10^{th} of Inch	Frequency Docking	Frequency Weaning	Frequency Market
1.27	5	4		
1.52	6	26	10	4
1.77	7	37	6	7
2.03	8	71	22	13
2.28	9	48	24	9

2.54	10	82	40	19
2.79	11	45	30	21
3.04	12	96	49	30
3.30	13	41	27	38
3.55	14	76	52	53
3.81	15	37	36	33
4.06	16	78	71	43
4.31	17	20	49	41
4.57	18	46	74	37
4.82	19	18	59	47
5.08	20	39	60	61
5.33	21	4	17	38
5.58	22	9	35	32
5.84	23	2	17	34
6.09	24	3	12	17
6.35	25		11	20
6.60	26		3	14
6.85	27		5	15
7.11	28		1	2
7.36	29		2	15
7.62	30		1	5
7.87	31			1
8.12	32			3
	Total	782	713	652
	Missing	7	76	137
	System Total	789	789	789

Describe Changes in Tail Length after Docking

Mean changes in tail length were as follows: 1.23 ± 0.02 cm docking to market (n=646), 0.81 ± 0.02 cm docking to weaning (n=707), and 0.42 ± 0.03 cm weaning to market (n=646). Mean tail lengths at docking, weaning, and market indicate that, in general, the tail length increases as the lamb ages. However, while most docked tails grew in length from docking to weaning, and from weaning to market, 3.4% of the lamb's tails measured shorter at market than at docking, and 17.8% of the lamb's tails measured shorter at market than at weaning. Frequencies of changes in lamb tail lengths are shown in Table 3.

Table 3.
Frequency Table for Change in Tail Length of Lambs from Weaning to Market Measurements

Change in cm	Change in 10^{th} of inch	Weaning to Market Frequency	Docking to Market Frequency	Docking to Weaning Frequency
- 2.28	-9	4		
- 2.03	-8	4		
- 1.77	-7	6		
- 1.52	-6	10		
- 1.27	-5	8	1	
- 1.01	-4	10	2	
- .76	-3	19	2	2
- .50	-2	27	7	9
- .25	-1	27	10	14

0	0	73	18	59
+ .25	1	93	39	76
+ .50	2	113	42	180
+ .76	3	77	77	91
+ .1.01	4	70	100	103
+ 1.27	5	47	93	59
+ 1.52	6	32	86	38
+ 1.77	7	13	66	30
+ 2.03	8	7	37	13
+ 2.28	9	5	29	17
+ 2.54	10	0	14	6
+ 2.79	11	1	6	2
+ 3.04	12		10	4
+ 3.30	13		4	0
+ 3.55	14		2	1
+ 3.81	15		0	2
+ 4.06	16		1	1
	Total	646	646	707
	Missing	143	143	82
	System Total	789	789	789

Given the variability in tail length measured at docking, weaning, and market (due to actual physiological growth, measurement or recorder error, etc.), a prediction of market tail length can be calculated from both the docking measurements and weaning measurements. A general Linear Model in SPSS (ordinary least squares) was used to develop two prediction intervals around each individual market measurement. A prediction interval around market length was created from both the docking and weaning measurements. The Lower 99% Confidence Interval (LCI 99) for the predicted market length was deemed as a useful measure to address this issue. The LCI 99, the coefficients for the regression model for each equation, and the 99th percentile sheep from the market measurements were examined. It was found that to be 99% confident that a tail will measure 1.77 cm at market, the docking location would have to be at least 2.54 cm. Also, to be 99% sure ($P < 0.01$) that a tail will measure 1.77 cm at market, a lamb selected at weaning should measure at least 3.55 cm.

Discussion

Tails that are docked too short have been shown to contribute to an increased incidence of rectal prolapse (Thomas et al., 2003). However, as these data demonstrate, docking lambs at the DECF results in a population of lambs with a wide variation in tail length. This finding adds complexity to tail docking rule enforcement.

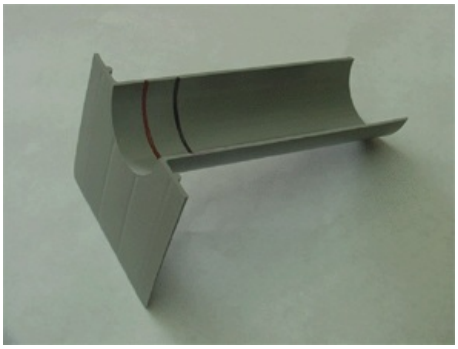
While this was not a study of rectal prolapse in lambs, it is interesting to note that the rectal prolapse rate for the study population docked at DECF was 0.15% or just over one tenth of a percent (1/646). This finding supports the results of Thomas et al. (2003), in which lambs docked similarly had a prolapse rate of 1.8%, significantly lower than the 7.8% observed in short-docked lambs. The authors also recommend more research on the issue of rectal prolapse as related to the interrelationships of tail length and effects of diet, stress, and, most important, genetics.

The measurements reported in the study were made with the DeTail Device™. Measuring the length of the tail with a ruler under the tail with the starting point at the body of the lamb in the area of the anus (as is the common method used currently) will produce a longer measurement because the DeTail Device makes more solid contact with the lamb's body at the ischeal tuberosities

The authors recognize while most docked tails grew in length from docking to weaning, and from weaning to market, 3.4% of the tails measured shorter at market than at docking, and 17.8% of the tails measured shorter at market than at weaning. The authors feel the major cause for this is the deposition of fat cover over the ischeal tuberosity on some lambs or, to a smaller degree, a data measuring/recording error. This will be an important factor for consideration so that youth lamb exhibitors will not inadvertently be excluded from competition at shows that are adopting minimum standards for lamb tail length. This finding also merits further research in order to fully understand the complexities of this issue.

A version of the DeTail Device (Figure 2.) calibrated at 1.77 cm (0.7 inch) and 3.55 cm (1.4 inch) would be useful for livestock shows adopting a 1.77 cm minimum standard and for exhibitors planning to exhibit lambs at those shows. The 3.55 cm mark on this version of the DeTail Device would guide exhibitors as they search for prospect lambs at weaning to ensure they will meet a minimum standard of 1.77 cm at market. This would send a powerful message to breeders if prospective buyers walked out of a pen of lambs without making a purchase because the lambs were docked too short. This version of the device has been developed and is distributed by Pipestone Vet Clinic in Minnesota. It can be seen and procured at http://www.pipevet.com. (**Disclaimer**: The authors realize the appearance of promotion of the "De-Tail Device"; however, there was no other means available to make needed measurements without the development of this tool. The patent for the device is owned by the University of Idaho Research Foundation, Inc.)

Figure 2.
Final Version of the De-Tail Device for Public Use



It must also be understood that the issue of tail length in show lambs is not just a matter of rectal prolapse. Other important reasons to address this issue are 1) in many states older (sometimes 3 to 4 months old), correctly docked (3-4 cm) lambs are re-docked without anesthetic, 2) complete tail removal of show lambs is a symptom of the larger issue of physical manipulation of show animals, which is under increased public scrutiny, and 3) when the sheep industry and animal health professional organizations recommend docking at the DECF and many state-level Extension systems choose to ignore those recommendations, there appears to be a significant disconnect between industry practice and Extension recommendations.

Exhibitors who have seen the proposed standard (1.77 cm as measured with the DeTail Device) in use at livestock shows have been supportive and describe it as fair, objective, consistent, and easy to communicate. Therefore, results from the study reported here of a large population of lambs measured in several states provide research-based information regarding the complexity of this issue: i.e., variation in tail length of lambs docked at the DECF and variations in how tail length changes from docking to market. It is hoped that this information will be useful as enforceable standards are developed in the future.

Implications

These results provide descriptive statistics that should help guide industry leaders as they set docking standards at shows and sales. Should livestock shows choose to adopt the 1.77 cm (0.7 inch) minimum standard as a definition of an appropriately docked lamb, then it should be made clear to breeders and exhibitors that the docking mean of 3.25 cm should be used to check the location of the docking procedure. As exhibitors purchase lambs for show, they may use the prediction model estimate of 3.55 cm at weaning as a guide to insure that their lamb will measure 1.77 cm at market. Due to the possible variations in measurement of a specific lamb by different raters and due to variation of measurements by the same rater, action to enforce a minimum standard for acceptably docked lambs should not be based on measurement from a single rater.

The authors recommend that shows or states implementing the 1.77 cm (0.7 inch) standard use a three-person enforcement committee at the show's weigh-in. One person should be designated to measure all lambs. If the initial measurement identifies a lamb as below the standard, the two other show officials will make one measurement each of the suspect animal. All three measurement officials must agree that the lamb is below the 1.77 cm (0.7 inch) minimum before the lamb is disqualified from exhibition.

The disqualification of a 4-H or FFA member's show animal because of tail length can be an emotionally charged issue. However, there is no difference in disqualification of a show animal for a tail length standard as recommended by the American Veterinary Medical Association and enforcing a standard on minimum and maximum weight requirements. It is hoped that the information revealed in this study can contribute to workable solutions to address the issue.

Some individuals have suggested that this issue should be addressed by club lamb producers and not by Extension. The authors disagree. This issue fits within Extension's educational mission just as other meat animal quality assurance, animal care and health issues such as proper use of animal health products, residue avoidance, club lamb fungus, and scrapie.

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