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Unilateral and bilateral compression of the epiglottis during poll flexion in harness racehorses

Unilateral og bilateral kompresjon av epiglottis under nakkefleksjon hos løpshester

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Summary

Title: Unilateral and bilateral compression of the epiglottis during poll flexion in harness racehorses

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Objectives: To describe a formerly unknown dynamic disorder of the epiglottis and to attempt to determine the pathogenesis and clinical relevance.

Methods: Medical records of Standardbred trotters and Norwegian Coldblooded trotters referred to the Norwegian School of Veterinary Medicine for upper airway evaluation with high-speed treadmill endoscopy were reviewed.

Results: 15 harness racehorses were diagnosed with unilateral or bilateral compression of the epiglottis during poll flexion. Harness racehorses, which are predisposed to this condition, demonstrate this disorder before the appearance of other dynamic airway disorders during the first period of induced poll flexion. In all cases, the compression of the epiglottis seemed to be due to inward pressure from the lateral pharyngeal wall and the thyrohyoid-thyroid cartilage articulation during periods of poll flexion.

Conclusions: Compression of the epiglottis during poll flexion in harness racehorses is a primary upper airway disorder induced by poll flexion. At present date, there are no surgical treatments. The current recommendations are use of tack to limit the degree of poll flexion in these horses.

Definitions and abbreviations

NCT	Norwegian Coldblooded Trotter
STB	Standardbred Trotter
URT	Upper Respiratory Tract
HSTV	High Speed Treadmill Videoendoscopy

Introduction

Abnormal respiratory noise during training and/or racing is often associated with poor performance in racehorses. A common cause of this abnormal noise is dynamic obstruction of the upper airway during exercise (Morris and Seeherman 1991; Kannegieter and Dore 1995). The development of high-speed treadmill videoendoscopy (HSTV) has made it possible to diagnose previously unrecognised forms of dynamic airway obstructions in horses (King et al. 2001). Certain of these diagnoses can only be made during HSTV including periods of induced poll flexion. This is achieved when horses are driven on the treadmill with full racing tack including bridle, noseband, head-check, a light harness and long reins (Fjordbakk et al. 2008) simulating a racing-situation. Additionally, many of the upper respiratory tract (URT) disorders become exacerbated during periods of induced poll flexion (Strand et al. 2012). According to previous studies, approximately 50% of horses presented for evaluation of the URT, had normal resting endoscopy but were diagnosed with dynamic URT obstruction when evaluated during strenuous exercise. Of these horses, 19%-56% had multiple abnormalities (Tan et al. 2005; Van Erck 2011; Davidson et al. 2011).

UPPER AIRWAY ABNORMALITIES

There are two categories of URT disorders: “static disorders” which are diagnosed when the horse is resting, and “dynamic disorders” which are only present when the horse is exercising. Previously described forms of dynamic URT disorders using HSTV are intermittent dorsal displacement of the soft palate (Morris & Seeherman 1991), dynamic collapse of the roof of the nasopharynx (Strand and Staempfli 1993), intermittent epiglottic entrapment (Weishaupt et al. 1998), epiglottic retroversion (Holcombe et al. 1997; Parente et al. 1998), axial deviation of the aryepiglottic folds (King et al. 2001) and palatal instability (Lane et al. 2006).

Previously described dynamic URT disorders seen under poll flexion on the treadmill are dynamic laryngeal collapse associated with poll flexion (Strand et al. 2004), dynamic collapse of the margins of the epiglottis (Strand et al. 2012) and ventral deviation of the apices of the left and right arytenoid cartilages (Strand et al. 2012).

UPPER AIRWAY FLOW MECHANICS AND PRESSURE MEASUREMENT

The horse is an obligate nasal breather and, unlike other mammalian species, cannot switch to mouth breathing to lower URT resistance during exhaustive training. The inspiratory tracheal pressure will typically increase over time during such activities. This reflects the increase in airflow through the URT needed to meet the greater oxygen demands of the muscles. It has been demonstrated that poll flexion during strenuous exercise causes a further increase in mean peak inspiratory tracheal pressure in both normal STBs (Petche et al. 1995), normal elite NCT racehorses, and also racehorses affected with URT disorders (Strand et al. 2009). This increase in mean inspiratory tracheal pressure is greater than when the same horses are driven at the same intensity with a free or neutral head carriage. It has also been demonstrated that the change in mean peak inspiratory tracheal pressure is much milder in the normal elite racehorse relative to those affected with dynamic laryngeal collapse (Strand et al. 2009), indicating that poll flexion can result in further upper airway collapse in horses that already have a URT disorder, as a result of further increase in intraluminal inspiratory airway pressures due to the Bernoulli principle and Venturi effect, on already weakened or fatigued neuromuscular function (Strand et al. 2009). Additionally, induced poll flexion has been demonstrated to cause collapse of certain URT structures through extraluminal compression (Fjordbakk et al. 2013).

TWO BREEDS OF TROTTING RACEHORSES IN NORWAY

In Norway, there are two breeds of trotting racehorses with no immediate direct common ancestry. These are the Standardbred trotter (STB) and Norwegian Coldblooded Trotter (NCT). The NCT was developed over the past century by crossing a local light draught horse breed, with a talent for trotting, with a Thoroughbred stallion. It is therefore a relatively new breed (Strand et al. 2009) with a great spread in talent level for racing (Velie et al. 2018). Similar Coldblooded trotting breeds exist in Sweden and Finland and these horses compete against each other in the same races. A former retrospective study which reviewed the relative prevalence of URT disorders in these two breeds of harness racehorses demonstrated that NCTs were especially predisposed to developing dynamic laryngeal collapse and flaccid epiglottis associated with poll flexion, relative to the STB (Strand et al. 2012). Compared to the STB, the NCT seems to have an exaggerated racing keenness requiring more restraint on the bit and reins by the driver. This may be a predisposing factor for this breed in the development of URT disorders associated with poll flexion (Strand et al. 2004, Fjordbakk et al. 2008).

Purpose

The purpose of this project is to report a previously undescribed form of URT obstruction involving the epiglottis in STBs and NCTs. This condition is a poll flexion dependent unilateral or bilateral compression of the base of the epiglottis. Additionally, we will describe a possible cause for this condition and try to establish a context between this and other laryngeal conditions in these horses.

Material and methods

HIGH SPEED TREADMILL VIDEOENDOSCOPY (HSTV)

The treadmill examinations were all performed with the same protocol.

The horses were equipped with full racing tack including bridle, noseband, head-check, a light harness and long reins. The videoendoscope was placed through the right nostril in a position that provided a good view of the larynx/ caudal nasopharynx. An experienced trainer of harness racehorses drove the horses standing behind the treadmill, and another person stood beside the horse's head and held the horse with a lead rope. As a part of the examination they induced poll flexion by applying tension on the long reins thus driving the horse on the bit.

Prior to the treadmill examination, the horses were trained on the treadmill one or two times to get acclimatized. After this, the horses were driven on the treadmill with a 3° treadmill incline at a speed adapted to the horse, resulting in fatigue after 4-7 minutes. The speed was usually 2.00min/km for the NCTs and 1.50 min/km for the STBs. The treadmill examination was terminated when, despite encouragement from the driver, the horse could no longer maintain its position on the treadmill. The full race speed driving was done in phases. Phase 1 was 1-2 minutes in "free head carriage", phase 2 was 1 minute in poll flexion, phase 3 was 1 minute again in "free head carriage" and so on. The transition from one phase to the next was marked on the endoscopic recordings either with a freeze image or a quick showing of the nasopharyngeal recess by dorsal movement of the endoscope tip. In addition, during the latter 2 years of the study, simultaneous tracheal inspiratory and expiratory pressures were performed during most treadmill examinations.

CRITERIA FOR CASE SELECTION

We reviewed the Norwegian School of Veterinary Medicine's journal system to identify cases suitable for the study and limited the population to active harness racehorses - NCTs and STBs. First, we explored ca. 400 electronic journals with the diagnosis "URT evaluation" from 2005 to fall 2019. This was approximately 50% NCTs and 50% SBTs. Thereafter, we also reviewed paper journals from 1998 to 2019, including diagnostic summary forms used to report findings from individual treadmill examinations. We included cases that had dynamic changes in the conformation of the epiglottis. From these sources we included cases diagnosed with collapse of the epiglottis; flaccid epiglottis; u-shaped epiglottis or collapse of the margins of the epiglottis. Then we reviewed the endoscopic videos of the HSTV from the respective treadmill examinations. Representative "freeze frame" pictures from these video evaluations depicting each horse's diagnoses were obtained. The pictures are provided with a description of the treadmill examination findings during each 1-minute treadmill phase in the result section: In addition, signalment and presenting complaints are presented for each horse.

Inclusion criteria for being part of the study were the following diagnoses: compression near the base of the epiglottis during poll flexion; collapse of the margins of the epiglottis; flaccid epiglottis or U-shaped epiglottis. It was important that the compression near the base of the epiglottis in poll flexion had an early onset during the treadmill examination and was already obvious in phase 2, and that any other URT conditions in general occurred later. Excluding factors used in the study included horses that received any form of URT surgery prior to the examination and horses diagnosed with "classic" dynamic laryngeal collapse (DLC) associated with poll flexion. Conformation changes in the epiglottis are common in horses with DLC (Fjordbakk et al. 2008; Strand et al. 2012).

To describe other upper respiratory conditions, including severity, occurring in our study population we have used a previously published schematic grading scale for dynamic collapse of the larynx and nasopharynx (Strand et al. 2012).

Results

Despite that horses diagnosed with “classic” dynamic laryngeal collapse associated with poll flexion was excluded from our study population, we present one horse that had dynamic laryngeal collapse and marked compression of the epiglottis near the base. We have included this horse as an illustration of a horse with both dynamic laryngeal collapse and collapse of the epiglottis, which has previously been described.

Alm Vilter

Alm Vilter was a 6-year-old NCT gelding. He was referred to the clinic because of perceived stiffness during training. He was examined on the treadmill 12.09.2012.

The treadmill examination findings:

The larynx looked normal at rest.

Phase 1: No obvious findings (Figure 1).

Phase 2 (poll flexion): Marked compression of the epiglottis near the base. Towards the end of this period, mild to moderate collapse of the vocal folds and arytenoid cartilages (Figure 2).

Phase 3: Base of the epiglottis returns to original position (figure 3). Mild collapse of the aryepiglottic fold on the right side.

Phase 4 (poll flexion): Marked compression of the epiglottis near the base (Figure 4), moderate collapse of the vocal folds and marked collapse of the aryepiglottic folds at the end

Phase 5: Base of the epiglottis returns to original “flattened” position.

Phase 6 (poll flexion): Marked compression of the epiglottis near the base, marked collapse of the vocal folds, moderate collapse of the aryepiglottic folds, mild to moderate dorsomedial deviation of the epiglottic margins and moderate to marked collapse of the arytenoid cartilage.

Phase 7 - slower speed: Marked collapse of the right aryepiglottic fold in the beginning. Base of the epiglottis returns to original position.

The horse was recommended treatment for a grade 1 out of 5 right forelimb lameness originating from the right carpus, but not for the URT abnormalities according to journal.

Before the treadmill examination, the horse had earned 9000 NOK in harness racing, afterwards 86 181 NOK (appendix 1).



Figure 1: Phase 1. Normal larynx.



Figure 2: Phase 2. Marked compression of the epiglottis near the base. Moderate collapse of the vocal folds and arytenoid cartilages.



Figure 3: Phase 3. Base of the epiglottis has returned to original position.



Figure 4: Phase 4. Marked compression of the epiglottis near the base and moderate collapse of the vocal folds.

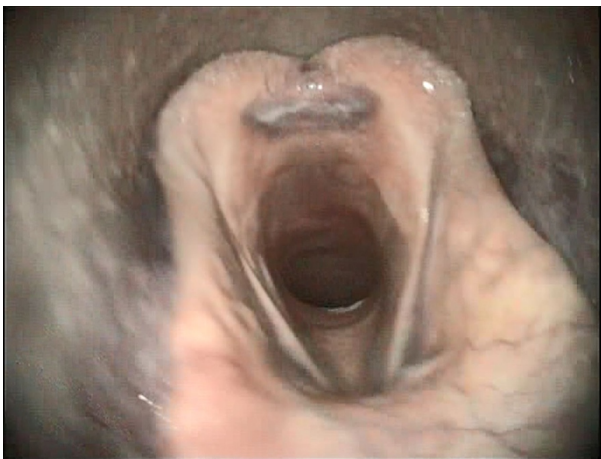


Figure 5: Phase 5. Base of the epiglottis has returned to original position.

The study population

The average amount of phases completed were 5 to 6, but this varied among the horses due to the impact of the URT conditions, the fitness level of the horse, and other physical factors.

Our study population consisted of 15 horses that met the inclusion criteria, 10 NCTs and 5 STBs. As far as we know, three of the horses had one or more treadmill examinations before the one leading to inclusion in our study. The horses are listed in order of examination date with name, age, breed and gender in Table 1.

TABLE 1: The horses in this study listed in order of examination date with name, age, breed and gender

NR.	Name	Age	Breed	Gender
1	Conch Shot	3	STB	Colt
2	Super Jo	3	NCT	Colt
3	Budalsguten	3	NCT	Male*
4	Fatima L.	4	STB	Mare
5	Verdandi	3	NCT	Filly
6	Miller Mollyn	6	NCT	Stallion
7	Holter Frigge	8	NCT	Mare
8	Krylling Viktoria	7	NCT	Mare
9	Høiby Riga	3	NCT	Filly
10	A Gifted Dancer	5	STB	Mare
11	Mollyn	3	NCT	Colt
12	Lykkje Rappen	5	NCT	Gelding
13	Norheim Jærv	10	NCT	Stallion
14	L'auren	4	STB	Mare
15	Time for Money	3	STB	Colt

*It is unclear if the horse was a gelding or a colt at the examination point, but he's now registered as a gelding.

As a summary of the results we have listed an overview of the horses included in the study with age, breed, gender and the URT diagnosis each horse had in each phase (Table 2).

TABLE 2: An overview over the horses in the study with age, breed, gender and the upper respiratory tract diagnosis each horse had in each phase.

Horse nr.	1. 3yr. STB	2. 3yr. NCT	3. 3yr. NCT	4. 4yr. STB	5. 3yr. NCT	6. 6yr. NCT	7. 8yr. NCT
Age. Breed	Colt	Colt	Male*	Mare	Filly	Stallion	Mare
Gender							
Poor performance	No	Yes	No	No	No	No	Yes
Reported abnormal respiratory sounds	Yes	No	No	No	Yes	Yes	No
COE	2, 4	2	2, 3, 4	Unilateral 2, 4, 5, 6	2, 4, 6	2, 3, 4, 5, 6	2, 4, 5, 6
ACC							
AEFC	3, 4	1, 3	1, 2, 3, 4, 5	1, 2, 3, 4, 5, 6, 7	6, 7		2, 3, 4, 5, 6, 7
DDSP	4						
DMDEM							2, 3, 4, 5, 6
PI					6		1, 2, 3, 4, 5, 6
VFC							
Comments	Overriding of the arytenoid cartilages at rest and phase 1, ventral displacement of the apices of the arytenoid cartilages in phase 2 + 3	Did not go forward aggressively on the treadmill	Collapsed in race *Unclear if he was a colt or gelding at the examination point	Loss of arytenoid abduction in phase 2, 4, 6			Some of the other diagnosis were unilateral and different graded sideways

Horse nr	8.	9.	10.	11.	12.	13.	14	15.
Age. Breed	7yr. NCT	3yr. NCT	5yr. STB	3yr. NCT	5yr. NCT	10yr. NCT	4yr. STB	3yr. STB
Gender	Mare	Filly	Mare	Colt	Gelding	Stallion	Mare	Colt
Poor performance	Yes	No	No	No	Yes	Yes	Yes	Yes
Reported abnormal respiratory sounds	No	Yes	Yes	Yes	No	No	Yes	Yes
COE	2, 4, 6	2, 4, 6	2	2, 3, 4	2, 4	2, 4, 6		Unilateral 2, 3
ACC					2, 3, 4		2, 4, 6	2, 3
AEFC	3, 4, 5, 6	2 (left)			5	2, 4, 6		
DDSP	7			4, 5		1*		1
DMDDEM	6, 7		2, 3	2, 4				
PI		1, 2, 3, 4, 5, 6, 7		4	5		3, 5	
VFC					4 (left)			
Comments		Nasopharyngeal ciatrix				Lame *Because of pressure measurement equipment		Loss of arytenoid abduction in phase 2 + 3

NCT = Norwegian Colblooded Trotter; STB = Standardbred Trotter; COE = Compression of the epiglottis; ACC = Arytenoid Cartilage Collapse;

AEFC = Aryepiglottic Fold Collapse; DDSP = Dorsal Displacement of Soft Palate; DMDDEM = Dorsomedial Deviation of Epiglottic Margins;

PI = Palatal Instability; VFC = Vocal Fold Collapse

As seen in Table 2, eight of the horses was referred due to abnormal respiratory sounds during training and/or racing (horse nr. 1, 5, 6, 9, 10, 11, 14, 15). Two of these horses had in addition a history of poor performance (horse nr. 14 and 15). Three of the horses made unusual respiratory noises especially when driven onto the bit (horse nr. 6, 9 and 15). Five of the horses (horse nr. 2, 7, 8, 12 and 13) presented because of poor performance only. The last two horses were referred due to a collapse in a race as a young horse (horse nr. 3) and for a routine fitness test (horse nr. 4).

In Table 3, we have summarized the horses by breed, severity of the condition, and if the compression near the base of the epiglottis was unilateral or bilateral. Among the STB horses there were two horses with moderate to marked compression near the base of the epiglottis in poll flexion (horse nr. 1 and 15), two that had moderate compression in poll flexion (horse nr. 10 and 14). One had a mild compression near the base of the epiglottis during free head carriage, but with moderate compression during poll flexion (horse nr. 4). Three were bilateral (horse nr. 1, 10 and 14), but two of these were more compressed on one side (horse nr. 1 and 14).

Only one of the NCTs had unilateral compression during some of the phases (horse nr.7) and the other nine had a bilateral compression. Two of the NCTs had mild compression near the base of the epiglottis in poll flexion (horse nr. 2 and 13). One had mild to moderate compression in poll flexion (horse nr. 5), three had moderate compression in poll flexion (horse nr. 8, 9 and 12) and one had marked compression in poll flexion (horse nr. 3). In addition, one had moderate compression of the epiglottis near the base in poll flexion and mild during free head carriage (horse nr. 6), one had mainly moderate compression in poll

flexion (horse nr.7) and one had moderate to marked compression near the base of the epiglottis in poll flexion and mild during free head carriage (horse nr. 11).

In Table 4, we have summarized all the races and earnings before and after the treadmill evaluation and whether the horse underwent surgery or not. Eight of the horses underwent surgery after the treadmill evaluations. One of these horses had not been competing before the surgery and had a low earning afterwards (horse nr. 1). Two of the horses that had been competing before surgery did not race afterwards (horse nr. 3 and 6). One horse that had been competing before surgery only participated in one race afterwards, and did not finish that race (horse nr. 7). The other four horses are registered with earnings both before and after surgery (horse nr. 8, 10, 11 and 12). Only one horse had a higher earning after surgery than before (horse nr. 11). Of the other horses, two did not race before nor after the treadmill evaluations (horse nr. 2 and 9). The two with higher earnings after treadmill examinations (horse nr. 5 and 15) were recommended equipment change, where one was recommended throat plate, martingale and long check reins (horse nr. 15) and one “Vik-lyn halter” (horse nr. 5) as seen in Table 5. Four horses had no registered recommendations regarding either equipment change or surgery after the examination (horses nr. 2, 4, 13 and 14). Three of these earned more prize money before than after the treadmill examination (horse nr 3, 13 and 14) and one had not been competing neither before nor after the treadmill evaluation (horse nr. 2).

In Table 5, we have summarized all the different treatments that were recommended to the owners/trainers. We have listed what kind of surgery was performed on the different horses, and what kind of equipment changes they were recommended.

TABLE 3: Horses listed by breed, severity of the condition during each phase and whether the compression near the base of the epiglottis was unilateral or bilateral

Horse number	Breed	Compression near the base of the epiglottis - phases			Unilateral/bilateral	Comments
		Mild	Moderate	Marked		
1.	STB		2, 4	4	Bilateral	Especially on the left side
2.	NCT	2			Bilateral	
3.	NCT	3		2, 4	Bilateral	
4.	STB	5	2, 4, 6		Unilateral	Left side
5.	NCT	2, 4, 6	2, 4, 6		Bilateral	
6.	NCT	3, 5	2, 4, 6		Bilateral	
7.	NCT	(5)	2, 4, (5), 6		Bilateral/unilateral	Bilateral in phase 2, intermittent in phase 5. Especially on right side in phase 4, 5 and 6.
8.	NCT		2, 4, 6		Bilateral	
9.	NCT		2, 4, (6)		Bilateral	Maybe compression in phase 6, but hard to see due to moisture.
10.	STB		2		Bilateral	
11.	NCT	3	2, 4	2	Bilateral	
12.	NCT		2, 4		Bilateral	
13.	NCT	2, 4, 6			Bilateral	
14.	STB		2, 4, 6		Unilateral (bilateral)	Especially on right side
15.	STB		3	2, 3	Unilateral	Especially on left side.

TABLE 4: A summary of all the races and earnings before and after the treadmill evaluation and whether the horse had surgery performed, or not.

Horse nr	Races before	Placings			Money earned before	Surgery Performed?	Races after	Placings			Money earned after
		1st	2nd	3rd				1st	2nd	3rd	
1	0	0	0	0	0 NOK	Yes	7	1	0	0	17 000 NOK
2	0	0	0	0	0 NOK	No	0	0	0	0	0 NOK
3	10	0	2	1	27 116 NOK	Yes	0	0	0	0	0 NOK
4	9	2	0	1	73 000 NOK	No	2	0	0	0	2 000 NOK
5	0	0	0	0	0 NOK	No	14	0	1	1	24 500 NOK
6	26	0	3	2	52 000 NOK	Yes	0	0	0	0	0 NOK
7	83	3	2	9	179 900 NOK	Yes	1	0	0	0	0 NOK
8	16	1	1	1	49 826 NOK	Yes	9	1	1	0	24 500 NOK
9	0	0	0	0	0	No	0	0	0	0	0 NOK
10	13	1	2	2	79 500 NOK	Yes	9	0	2	1	30 000 NOK
11	15	1	0	1	74 500 NOK	Yes	31	3	3	1	122 000 NOK
12	23	2	1	4	63 500 NOK	Yes	7	0	0	0	3000 NOK
13	102	21	20	14	1 997 500 NOK	No	7	0	1	0	32 500 NOK
14	6	0	0	0	3000 NOK	No	0	0	0	0	0
15	5	0	3	1	100 635NOK	No	17	2	3	1	163 551 NOK

TABLE 5: A summary of all the treatments that were recommended to the study population of 15 horses.

Horse nr	Surgery	Tack management	No treatment	Other
1	Bilateral sternothyroid tenotomy, staphylectomy and Teflon augmentation of epiglottis			
2			Did not receive any treatment	
3	Teflon augmentation of the epiglottis	Vik-Lyn halter		
4			No registered treatment	
5		Vik-Lyn Halter		
6	Laser resection of the aryepiglottic folds	Vik-Lyn Halter		
7	Bilateral laser resection of the aryepiglottic folds			
8	Tie-forward surgery			
9		Longer check-reins and a throat plate		Try to keep her calmer
10	Bilateral sternothyroideus muscle transection			
11	Tie forward surgery	Plate under the throatlatch region		
12	Laser resection of the vocal folds and ventricle on the left side.			
13			No registered treatment for URT-disorder	Surgery for lameness-problem
14			No registered recommendations	
15		Throat plate and long check reins		

Conch Shot (1)

Conch Shot was a 3-year-old STB colt who was referred to the clinic because he made abnormal respiratory noise when driven at speed in training and racing. Before he presented to the clinic he had recovered from a recent respiratory infection with nasal discharge and coughing. He was examined on the treadmill 27.04.2004.

The treadmill examination:

Intermandibular width was four knuckles.

Rest: Mild overriding of the arytenoid cartilages (Figure 1).

Phase 1: Mild collapse of the pharyngeal roof. Mild overriding of the left arytenoid cartilage.

Otherwise the larynx appeared normal and wide.

Phase 2 (poll flexion): Ventral displacement of the apices of the arytenoid cartilages.

Moderate compression of the epiglottis near the base, especially left side (Figure 2).

Phase 3: Aryepiglottic fold collapse. Ventral displacement of the apices of the arytenoid cartilages. The base of the epiglottis returned to original position.

Phase 4 (poll flexion): Moderate to marked compression of epiglottis near the base. Marked aryepiglottic fold collapse (Figure 3). Dorsal dislocation of the soft palate.

Prior to the treadmill examination he had not been competing, afterwards he earned 17.700 NOK in harness racing (appendix 2)

On 30.4.04 a bilateral sternothyroid tenotomy, 5 mm staphylectomy and Teflon augmentation of epiglottis was performed.



Figure 1: Mild overriding of the left arytenoid cartilage, otherwise larynx is normal.



Figure 2: Ventral displacement of the apices of the arytenoid cartilages. Moderate compression of the epiglottis near the base, especially left side.



Figure 3: Ventral displacement of the apices of the arytenoid cartilages. Moderate to marked compression of the epiglottis near the base, especially left side. Marked right aryepiglottic fold collapse.

Super Jo (2)

Super Jo was a 3-year-old NCT colt who presented to the clinic because the trainer/owner complained that the horse did not wish to train or go forward during exercise. He was examined on the treadmill 14.09.2005.

The treadmill examination:

Resting endoscopy: slightly lazy right arytenoid, but full abduction after nasal occlusion.

Phase 1: Larynx appears normal, but there is a small swelling/ mass on the right epiglottis wing (Figure 1).

Phase 2 (poll flexion): Mild collapse of the aryepiglottic folds. Mild compression of the epiglottis near the base (Figure 2)

phase 3: Very mild collapse of the aryepiglottic folds, otherwise the base of the epiglottis returns to original position (Figure 3)

This horse did not go forward aggressively on treadmill. Seems like this horse didn't follow the protocol, but instead had a longer poll flexion period, possibly interrupted by free head carriage. According to journal he did not receive any treatment.

Before the treadmill examination he had not been competing in harness races, but he had participated in two test-races (Appendix 3). He didn't race after the treadmill examination.



Figure 1: Phase 1. Swelling on the right epiglottic wing, otherwise larynx is normal.



Figure 2: Phase 2. Mild compression of the epiglottis near the base.

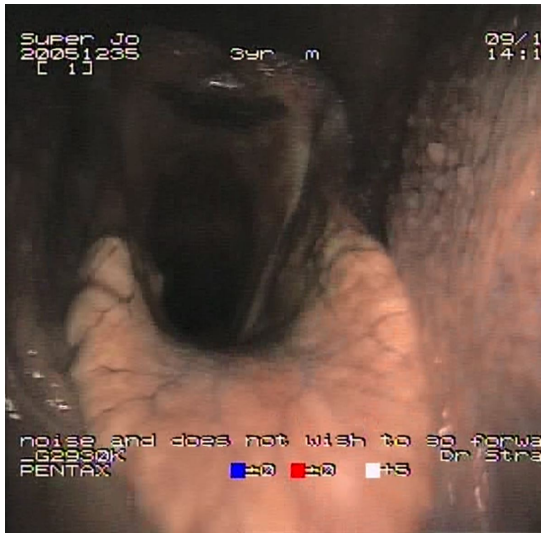


Figure 3: Phase 3. Very mild collapse of the aryepiglottic folds, the base of the epiglottis has returned to original position.

Budalsguten (3)

Budalsguten was 3-year-old NCT male who was referred to the clinic because he had recently physically collapsed during a race. He had pulled very hard onto the bit and required considerable restraint during the race. He was examined on the treadmill 08.12.2008. He was driven at 2.05 min/km 3 degrees uphill.

The treadmill examination:

Rest: Larynx looks normal.

Phase 1: Mild collapse of the aryepiglottic folds, especially right side, otherwise larynx looks normal (Figure 1).

Phase 2 (poll flexion): Marked compression of the epiglottis near the base (Figure 2). Mild collapse of the aryepiglottic folds, especially right side.

Phase 3: Mild compression of the epiglottis near the base (Figure 3). Mild to moderate collapse of the aryepiglottic folds, especially right side.

Phase 4 (poll flexion): Marked compression of the epiglottis near the base (Figure 4).

Moderate collapse of the aryepiglottic folds, especially right side.

Phase 5: Mild collapse of the right aryepiglottic fold, otherwise the base of the epiglottis returns to original position (figure 5).

After the examination surgery was recommended; a teflon augmentation of the epiglottis was performed 14.12.2008. They were also recommended to use the Vik-Lyn check.

Before the treadmill examination, he had earned 27 116 NOK in harness racing (appendix 4).

He didn't race after the examination.

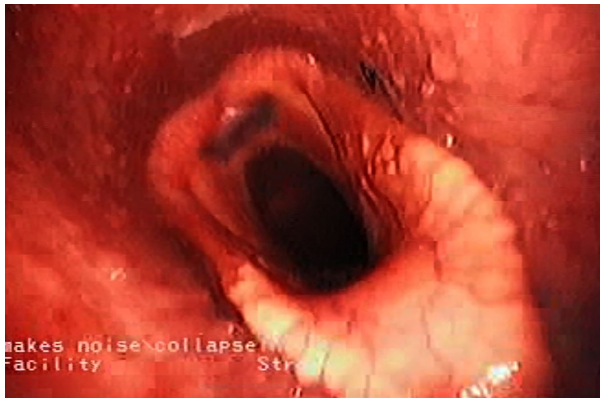


Figure 1: Phase 1. Normal larynx.



Figure 2: Phase 2. Marked compression of the epiglottis near the base.



Figure 3: Phase 3. Mild compression of the epiglottis near the base.



Figure 4: Phase 4. Marked compression of the epiglottis near the base.



Figure 5: Phase 5. Base of the epiglottis has returned to original position.

Fatima L. (4)

Fatima L was a 4-year-old STB mare who was referred to the clinic for a standard HSTV. She was driven on the treadmill for over 3000m at 1:50 min/km pace and 3 degrees uphill. The treadmill examination was performed 02.06.2009.

The treadmill examination:

Rest: Larynx appears normal.

Phase 1: Mild right aryepiglottic fold collapse, otherwise larynx appears normal (Figure 1).

Phase 2 (poll flexion): Mild bilateral aryepiglottic fold collapse. Moderate unilateral compression of the epiglottis near the base on the left side.. (Figure 2)

Phase 3: Mild right aryepiglottic fold collapse and epiglottis is in the baseline confirmation (Figure 3).

Phase 4 (poll flexion): Moderate unilateral compression of the epiglottis near the base on the left side. Mild bilateral loss of arytenoid abduction (Figure 4). Moderate right aryepiglottic fold collapse, mild left aryepiglottic fold collapse.

Phase 5: Mild right aryepiglottic fold collapse and mild unilateral compression of the epiglottis near the base on the left side (Figure 5).

Phase 6 (poll flexion): Moderate unilateral compression of the epiglottis near the base on the

left side and mild bilateral loss of arytenoid abduction. Moderate right aryepiglottic fold collapse.

Phase 7 (slower speed): Mild right aryepiglottic fold collapse, base of the epiglottis returns to original position.

Before the treadmill examination she had earned 73 000 NOK, afterwards she earned 2000 NOK (appendix 5).



Figure 1: phase 1. Normal larynx.



Figure 2: Phase 2. Moderate unilateral compression of the epiglottis near the base on the left side (arrow). Mild bilateral loss of arytenoid abduction.

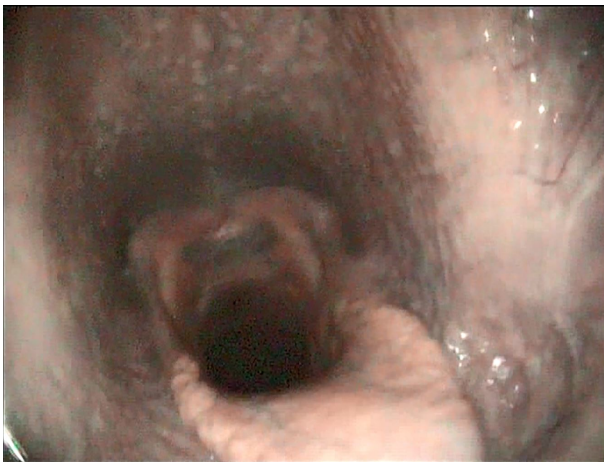


Figure 3: Phase 3. This epiglottis is in the baseline confirmation



Figure 4: Phase 4. Moderate unilateral compression of the epiglottis near the base on the left side. Mild bilateral loss of arytenoid abduction

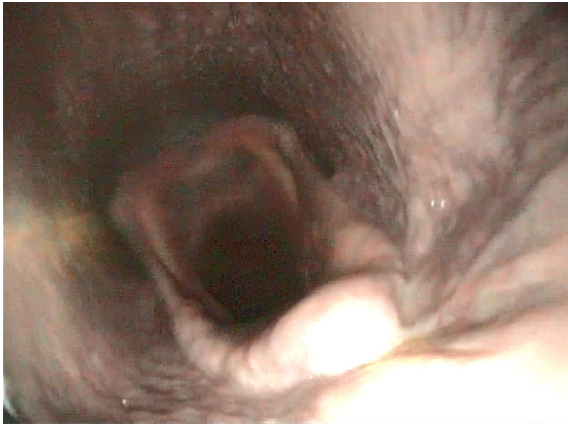


Figure 5: Phase 5. Mild unilateral compression of the epiglottis near the base on the left side.

Verdandi (5)

Verdandi was a 3-year-old NCT filly. She presented to the clinic because of abnormal respiratory noise during training and racing. She was examined on the treadmill three times. The first time was 18.08.2010, the only thing they could see was palatal instability, but this didn't correspond with the owners/trainer's description of what was wrong. Therefore, she was examined once more 19.08.2010

The treadmill examination:

Mild pharyngeal lymphoid hyperplasia

Rest: The larynx looks normal in rest

Phase 1: Larynx looks normal (Figure 1).

Phase 2 (poll flexion): Larynx gets narrower because of collapse of the pharyngeal walls, this causes a mild to moderate compression of the epiglottis near the base. This gets worse the longer she exercises in poll flexion (Figure 2).

Phase 3: Larynx gets wider and the base of the epiglottis returns to original position (Figure 3).

Phase 4 (poll flexion): Larynx gets narrower because of collapse of the pharyngeal walls; this causes a mild to moderate compression of the epiglottis near the base (Figure 4).

Phase 5: Larynx gets wider and the base of the epiglottis returns to original position (Figure 5)

Phase 6 (poll flexion): Larynx gets narrower because of collapse of the pharyngeal walls, this causes a mild to moderate compression of the epiglottis near the base. Here she also develops palatal instability and aryepiglottic fold collapse.

Phase 7: Larynx gets wider and the base of the epiglottis returns to original position, but here she still has aryepiglottic fold collapse.

After this examination they were recommended to try the “Vik-Lyn halter”. She was then examined once more on the treadmill 20.08.2010 with the “Vik-Lyn halter”, and she was much better in the periods with poll flexion. The owner and trainer were then recommended to try “Vik-Lyn halter” in both training and racing.

Before this examination, Verdandi had no race earnings, however afterwards she earned 24 500 NOK (appendix 6).



Figure 1: Phase 1. Normal larynx

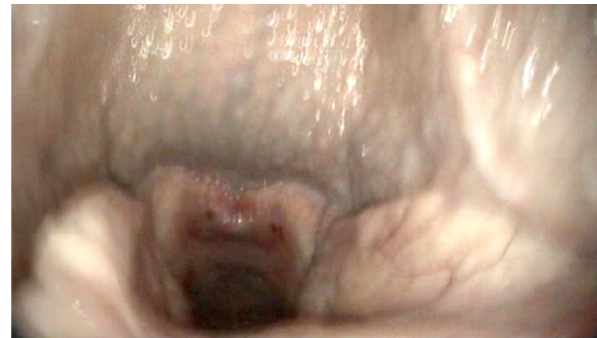


Figure 2: Phase 2 Mild to moderate compression of the epiglottis near the base



Figure 3: Phase 3. Larynx gets wider and the base of the epiglottis returns to original position



Figure 4: Phase 4. Mild to moderate compression of the epiglottis near the base



Figure 5: Phase 5. Larynx gets wider and the base of the epiglottis returns to original position

Miller Mollyn (6)

Miller Mollyn was a 6-year-old NCT stallion. He was referred to the clinic because he trained especially hard onto the bit, and during these periods make abnormal respiratory noise. He was examined on the treadmill 25.09.2010

The treadmill examination:

Rest: The larynx looks normal in rest

Phase 1: There is no change in larynx during this phase (Figure 1).

Phase 2 (poll flexion): The camera is very unsteady during this phase, but the horse develops moderate compression of the epiglottis near the base (Figure 2).

Phase 3: The base of the epiglottis returns to its somewhat original position, but there is still a mild compression of the epiglottis near the base present (Figure 3).

Phase 4 (poll flexion): A moderate compression of the epiglottis near the base present (Figure 4).

Phase 5: The base of the epiglottis returns to its somewhat original position, but there is still a mild compression of the epiglottis near the base present. (Figure 5). There is also a moderate aryepiglottic fold collapse and a mild arytenoid collapse

Phase 6 (poll flexion): A moderate compression of the epiglottis near the base present and a mild arytenoid collapse

After the treadmill examination, the horse underwent laser resection of the aryepiglottic folds, which was performed the 24.09.2010. Additionally, use of the Vik Lyn halter to limit the compression of the epiglottis in poll flexion was recommended.

Before the examination Miller Mollyn had earned 52 000 NOK. He did not return to racing after diagnosis and treatment (appendix 7).



Figure 1: Phase 1. Normal larynx

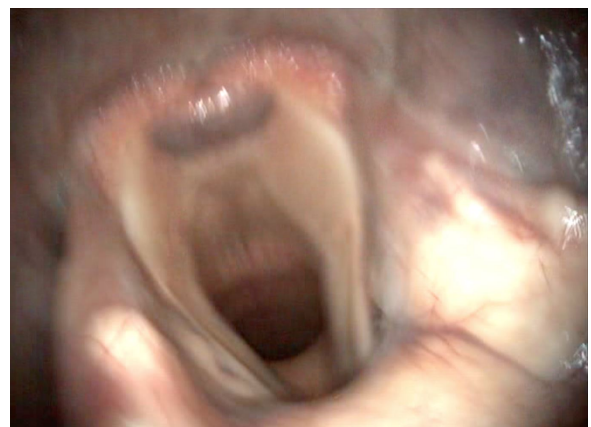


Figure 2: Phase 2. Moderate compression of the epiglottis near the base



Figure 3: Phase 3. The base of the epiglottis has returned to it's somewhat original position, but there is still a mild compression of the epiglottis near the base present



Figure 1: Phase 4. Moderate compression of the epiglottis near the base



Figure 2: Phase 5. The base of the epiglottis has returned to it somewhat original position, but there is still a mild compression of the epiglottis near the base present

Holter Frigge (7)

Holter Frigge was an 8-year-old NCT mare. She was referred to the clinic for a treadmill examination with an EKG. Before this she had an examination of her heart at a different clinic. She had a history of poor performance in races - and stopped up. She was examined on the treadmill 17.11.2011.

The treadmill examination:

Rest: The larynx looks normal.

Phase 1: Mild form of palatal instability develops, otherwise larynx looks normal (Figure 1)

Phase 2 (poll flexion): Moderate compression of the epiglottis near the base. The palatal instability gets worse. Moderate right aryepiglottic fold collapse, mild on the left side together with moderate dorsomedial deviation of the epiglottic margin (Figure 2).

Phase 3: Base of the epiglottis returns to original position (Figure 3). Mild collapse of the right aryepiglottic fold, mild dorsomedial deviation of the left epiglottic margin. Just mild palatal instability.

Phase 4 (poll flexion): Moderate compression of the epiglottis near the base, especially on the right side. Moderate collapse of the right aryepiglottic fold (Figure 4) and moderate dorsomedial deviation of the left epiglottic margin, flutters more on this side. Mild palatal instability.

Phase 5: Base of the epiglottis returns to original position, but intermitted mild to moderate compression of the epiglottis near the base on the right side. Mild aryepiglottic folds collapse bilaterally, with mild dorsomedial deviation of the left epiglottic margin (flutters) (figure 5). Mild palatal instability.

Phase 6 (poll flexion): Compression of the epiglottis near the base, especially on the right side. Moderate to marked collapse of the right aryepiglottic fold, left side has moderate collapse of the aryepiglottic fold together with moderate dorsomedial deviation of the epiglottic margin. The palatal instability gets worse.

Phase 7: slower speed: Mild collapse of the aryepiglottic folds bilaterally, mild fluttering of the margin of the epiglottis on the left side. Base of the epiglottis returns to original position.

Technical problems occurred with the EKG under the treadmill examination, but no signs of arrhythmia were noted during warm-up or immediately after the endoscopy protocol. When she had aryepiglottic fold collapse and flaccid epiglottis during the treadmill examination, she

made unusual inspiratory noises. During the treadmill examination she also ran with her tongue out of her mouth on the right side. The recommendation after the endoscopy was laser surgery with bilateral aryepiglottic fold resection, this was performed 18.11.2011.

Before the treadmill examination she had earned 179.900 NOK in harness racing, afterwards she participated in just one race, but she didn't finish (appendix 8).



Figure 1: Phase 1. Normal larynx.



Figure 2: Phase 2. Moderate compression of the epiglottis near the base. Mild aryepiglottic fold collapse on the right side and moderate dorsomedial deviation of the epiglottic margin on the right side.

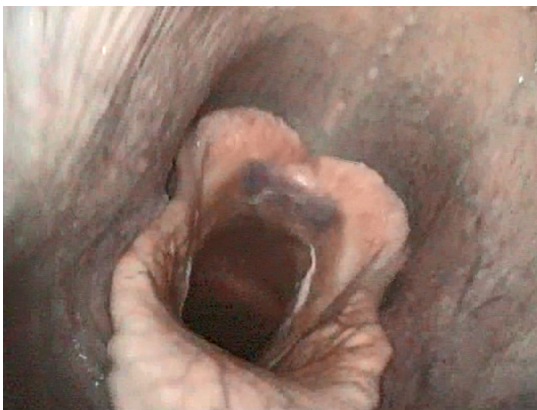


Figure 3: Phase 3. Base of the epiglottis has returned to original position.

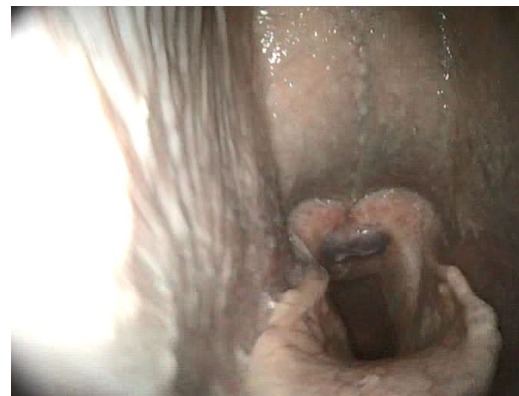


Figure 4: Phase 4. Moderate compression of the epiglottis near the base, especially on the right side. Mild collapse of the right aryepiglottic fold. Mild dorsomedial deviation of the left epiglottic margin.



Figure 5: Phase 5. Mild to moderate compression of the epiglottis near the base on the right side. Mild aryepiglottic folds collapse bilaterally, with mild dorsomedial deviation of the left epiglottic margin.

Krylling Viktoria (8)

Krylling Viktoria was a 7-year-old NCT mare. She presented twice to the clinic for treadmill examination. The first time, in May 2012, presenting complaint was the horse stopping in a race; however, the horse made no reported abnormal respiratory noise. She was examined on the treadmill 31.05.2012

The treadmill examination:

The larynx looks normal during rest

Phase 1: The larynx looks normal here as well (Figure 1).

Phase 2 (poll flexion): Moderate compression of the epiglottis near the base (Figure 2).

Phase 3: The base of the epiglottis returns to somewhat original position, but she develops aryepiglottic fold collapse (Figure 3).

Phase 4 (poll flexion): A moderate compression of the epiglottis near the base and an aryepiglottic fold collapse especially on the right side (Figure 4).

Phase 5: The base of the epiglottis returns to somewhat original position, but she still has a aryepiglottic fold collapse, especially on the right side (Figure 5).

Phase 6 (poll flexion): A moderate compression of the epiglottis near the base and an aryepiglottic fold collapse especially on the right side. Here she also develops palatal instability.

Phase 7: slower speed: Here she only has palatal instability. She also develops DDSP 4 times, the epiglottis is dislocated for about 2-4 sec each time before it is relocated again.

A tie-forward surgery was recommended, which was performed 28.05.2013.

Before the treadmill examination she had earned ca. 49 826 NOK, afterwards 24 500 NOK (appendix 9).

Krylling Viktoria came back to the clinic in May 2013 for a control evaluation. Her owner stated that the horse has lots of capacity, but still makes noise. She was re-examined on the treadmill 28.05.2013, with findings very much like the last time, except there was no development of DDSP.



Figure 1: Phase 1. Normal larynx, a bit lazy arytenoid cartilages right here.

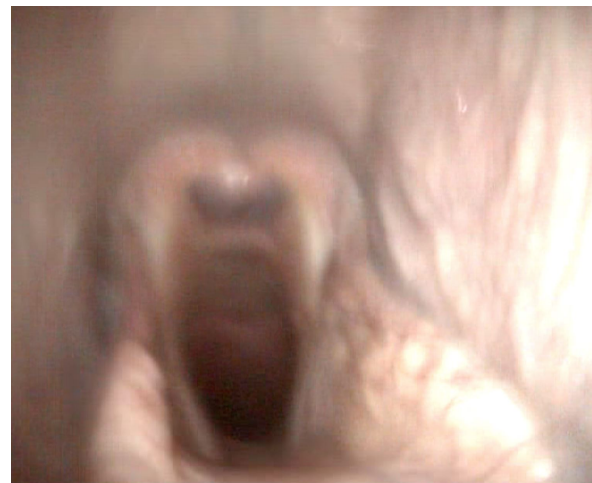


Figure 2: Phase 2. Moderate compression of the epiglottis near the base



Figure 3: Phase 3. Base of the epiglottis has returned to somewhat original position



Figure 4: Phase 4. Moderate compression of the epiglottis near the base



Figure 5: Phase 5. Base of the epiglottis has returned to somewhat original position

Høiby Riga (9)

Høiby Riga was a 3-year-old NCT filly. She was referred to the clinic for a treadmill evaluation of the upper airways. The owner had over a longer period been suspicious that the horse had a problem with its upper airways, because when she drank or ate too quickly she coughed, and when driven at high speed onto the bit (with poll flexion) she made abnormal respiratory noise. She was examined on the treadmill 20.09.2012.

The treadmill examination:

She had a mild nasopharyngeal cicatrix, around 4 mm high. Mild lymphoid hyperplasia.

Phase 1/slower speed: Some lifting of the epiglottis together with palatal instability, otherwise larynx appears normal (Figure 1).

Phase 2 (poll flexion): The palatal instability worsens. Larynx is narrower, moderate compression of the epiglottis near the base. Mild collapse of the left aryepiglottic fold. (Figure 2).

Phase 3: The palatal instability gets milder. Base of the epiglottis returns to original position. (Figure 3).

Phase 4 (poll flexion): Larynx gets narrower, again worsened palatal instability. The epiglottis seems moderate compressed near the base towards the end (Figure 4).

Phase 5: Palatal instability becomes milder, base of the epiglottis returns to original position.

Phase 6 (poll flexion): Larynx gets narrower, maybe compression near base of the epiglottis also, worse palatal instability. Hard to see because the video is blurry due to moisture.

phase 7: slower speed: less palatal instability and more open larynx.

During the examination she made abnormal respiratory noise at speed during poll flexion. The recommendation after the examination was to continue training, but with a longer check rein and a throat plate, and try to keep her calmer, and maybe have a new examination after a few months.

Høiby Riga has not been harness racing, neither before nor after the examination.



Figure 1: Phase 1/slow speed. Nasopharyngeal cicatrix. Normal larynx.



Figure 2: Phase 2. Larynx is narrower with moderate compression of the epiglottis near the base. Very mild collapse of the left aryepiglottic fold.



Figure 3: Phase 3. Nasopharyngeal cicatrix. Base of the epiglottis has returned to original position.



Figure 4: Phase 4. Nasopharyngeal cicatrix. Larynx is narrower, moderate compression of the epiglottis near the base.

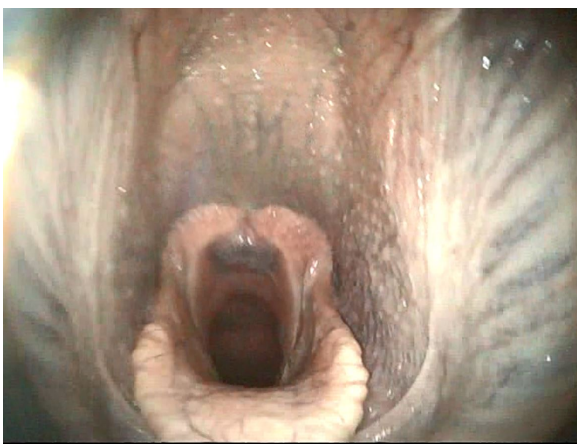


Figure 5: Phase 5. Nasopharyngeal cicatrix. Base of the epiglottis has returned to original position.

A Gifted Dancer (10)

“A Gifted Dancer” was a 5-year-old STB mare. She was referred to the clinic because of unusual respiratory noise during training.

She was examined on the treadmill 7.1.2015

The treadmill examination:

Rest: Mild pharyngeal lymphoid hyperplasia.

Phase 1: No change in the larynx (Figure 1). Pharyngeal roof instability, especially towards the end.

Phase 2 (poll flexion): Moderate compression of the epiglottis near the base. Moderate dorsomedial deviation of the right epiglottic margin (Figure 2).

Phase 3 - slower speed: mild dorsomedial deviation of the right epiglottic margin. The base of the epiglottis returns to original position (Figure 3).

Gastroscopy was performed the same day which revealed several gastric ulcerations. The horse additionally had mild elevation of muscle enzymes the morning after the treadmill evaluation. Bilateral sternothyroideus muscle resection was performed on this horse on 08.01.2015.

Before the surgery she had earned 79 500 NOK in harness racing, afterwards 30 000 NOK (appendix 10).



Figure 1: Phase 1. Normal larynx.



Figure 2: Phase 2. Moderate compression of the epiglottis near the base. Moderate dorsomedial deviation of the right epiglottis margin.

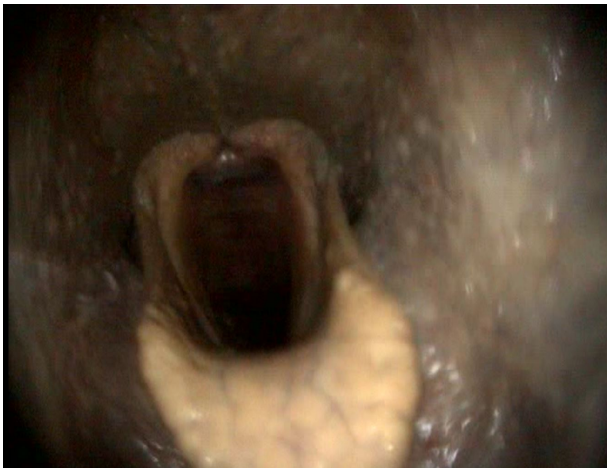


Figure 3: Phase 3. The base of the epiglottis has returned to original position.

Mollyn (11)

“Mollyn” was a 3-year-old NCT colt. He presented to the clinic because he had abnormal respiratory noise during training and racing, but he was a good racehorse. He was examined on the treadmill 03.12.2015

The treadmill examination:

Rest: The larynx looks normal at rest

Phase 1: The larynx is within normal limits during this phase (Figure 1).

Phase 2 (poll flexion): Moderate compression of the epiglottis near the base. It seems as if the pharyngeal walls are pushing inwards on the epiglottic margins (Figure 2).

Phase 3: There is still a mild compression of the epiglottis near the base, especially on the left side during this phase. This makes it look as if the larynx is a bit wider (Figure 3).

Phase 4 (poll flexion): Moderate compression of the epiglottis near the base. It appears as if the pharyngeal walls are pushing inwards on the epiglottic margins (Figure 4). The camera is very unsteady here, perhaps palatal instability. He develops DDPS during this phase.

Phase 5: Still DDSP which only relocates when the treadmill is slowed down.

It was recommended to perform tie-forward surgery for the DDSP which was performed 04.12.2015. To limit compression of the epiglottis – it was recommended they should try using a plate under the throatlatch region

Before the examination, Mollyn had earned 74 500 NOK and after the surgery he earned 122 000 NOK (appendix 11).

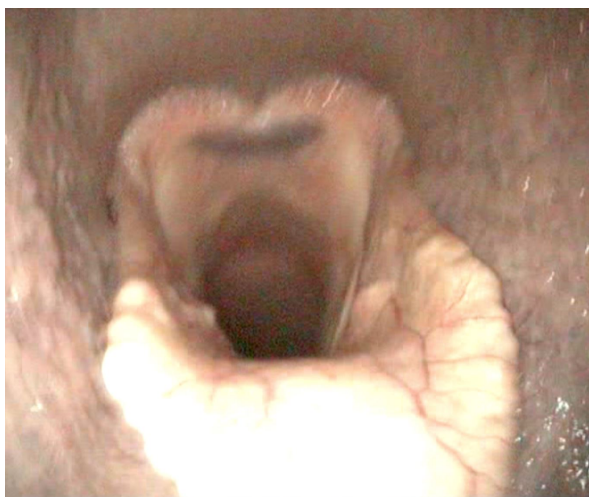


Figure 1: Phase 1. Normal larynx



Figure 2: Phase 2. A moderate compression of the epiglottis near the base. It seems as if the pharyngeal walls are pushing inwards on the epiglottic margins.



Figure 3: Phase 3. There is still a mild compression of the epiglottis near the base, especially on the left side during this phase.



Figure 4: Phase 4. A moderate compression of the epiglottis near the base. It appears as if the pharyngeal walls are compressing the epiglottic margins.

Lykkje Rappen (12)

Lykkje Rappen was a 5-year-old NCT gelding. He had raced a number of times, but in the previous 3-4 months his racing times were 1-3 seconds slower, and the horse finished his races poorly. His trainer described that he tried to drop his head in training/races, and when he was behind another horse, he dropped it to the level of the sulky seat. No abnormal respiratory noises were reported. He was examined on the treadmill 15.03.2016.

The treadmill examination:

His intermandibular space was measured to 6.2cm (narrow).

Mild pharyngeal lymphoid hyperplasia.

Rest/phase 1: Left arytenoid slightly lazy - but able to fully abduct when stimulated in rest/low speed, otherwise larynx appears normal (Figure 1).

Phase 2 (poll flexion): Moderate compression of the epiglottis near the base. Mild loss of abduction of the arytenoid cartilages (Figure 2).

Phase 3: Base of epiglottis returns to original position. Mild loss of abduction of the arytenoid cartilages (Figure 3).

Phase 4 (poll flexion): Moderate compression of the epiglottis near the base. Mild loss of abduction of the arytenoid cartilage on the right side, and moderate on the left side (Figure 4).

Phase 5, + slower speed: Base of the epiglottis and the arytenoid cartilages return to original positions (Figure 5). Moderate collapse of the aryepiglottic folds. According to journal developed palatal instability.

He underwent diode laser resection of the vocal folds and ventricle on the left side two days later. Prior to this he had earned 63.500 NOK in harness racing, afterwards he competed several times but only earned 3000 NOK (appendix 12).



Figure 1: Phase 1. Normal larynx.



Figure 2: Phase 2. Moderate compression of the epiglottis near the base. Mild loss of the arytenoid cartilage abduction bilaterally

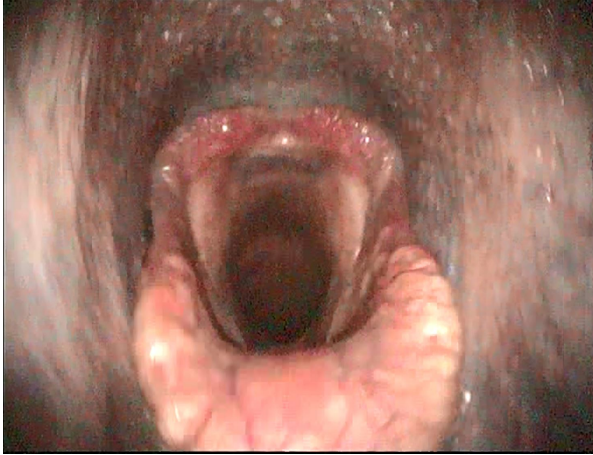


Figure 3: Phase 3. Base of epiglottis has returned to original position. Mild loss of the arytenoid cartilage abduction.



Figure 4: Phase 4. Moderate compression of the epiglottis near the base

Figure 5: Phase 5. The base of the epiglottis and the arytenoid cartilages have returned to original positions.

Norheim Jærv (13)

Norheim Jærv was a 10-year-old NCT stallion. He presented to the clinic due to recent poor performance. He was examined on the treadmill 30.01.2018

The treadmill examination:

Rest: The larynx appeared normal at rest.

Phase 1: Develops DDSP after about 10 sec (because of the pressure measurements equipment), but after a few seconds he swallows and relocates epiglottis. For the rest of this phase, the larynx looks normal (Figure 1).

Phase 2 (poll flexion): There is a mild compression of the epiglottis near the base and a mild aryepiglottic fold collapse (Figure 2).

Phase 3: The base of the epiglottis returns to original position (Figure 3)

Phase 4 (poll flexion): There is a mild compression of the epiglottis near the base and a mild aryepiglottic fold collapse (Figure 4).

Phase 5: The base of the epiglottis returns to original position (Figure 5)

Phase 6 (poll flexion): There is a mild compression of the epiglottis near the base and a mild aryepiglottic fold collapse.

Phase 7: The base of the epiglottis returns to original position.

Norheim Jærv had earned 1 997 500 NOK before the examination and 32 500 NOK after the examination (appendix 13).

Norheim Jærv also had a moderately effused digital flexor tendon sheath on the right forelimb and seemed asymmetric in the hindlimb on the treadmill. Upon lameness evaluation, he was 2 out of 5 degrees lame in the right forelimb and the tendon sheath was very distended and painful to deep palpation.

Average inspiratory and expiratory peak pressure of last 10 breaths of each phase in cmH₂O

(- is inspiratory)

Phase1 -23.98 +11.13

Phase 2 -33.02 +10.79

Phase 3 -28.11 + 8.19

Phase 4 -35.19 +10.69

Phase 5 - 35.25 + 9.88

Phase 6 -41.37 +12.57

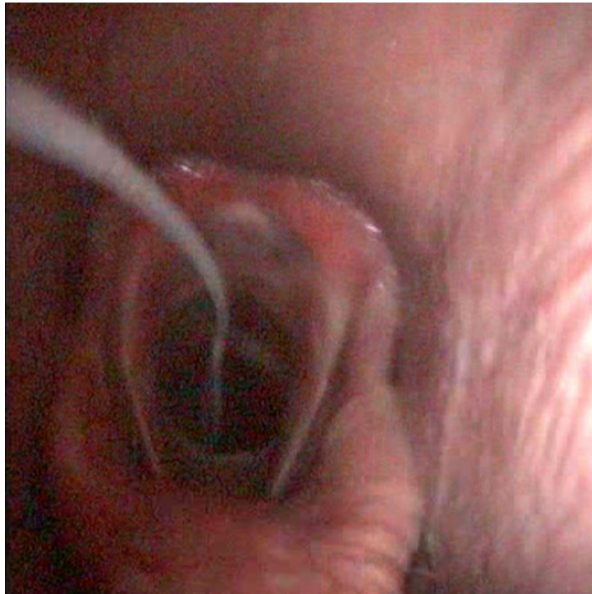


Figure 1: Phase 1. Normal larynx



Figure 2: Phase 2. There is a mild compression of the epiglottis near the base



Figure 3: Phase 3. The base of the epiglottis has returned to original position



Figure 4: Phase 4. There is a mild compression of the epiglottis near the base.



Figure 5: Phase 5. The base of the epiglottis has returned to original position

L'auren (14)

L'auren was a 4-year-old STB mare. She presented to the clinic because she had made abnormal respiratory noise during warmup before races, but not during the actual race. She had poor racing times due to stopping up and loss of rhythm. The treadmill examination was 13.02.2018

The treadmill examination:

The larynx looks normal at rest.

Phase 1: The larynx appears normal (Figure 1).

Phase 2 (poll flexion): Develops moderate compression of the epiglottis near the base, especially on the right side (Figure 2). It seems as the basihyoid bone is pushing on this region.

Phase 3: Here the base of the epiglottis returns to original position (Figure 3), but she has developed mild palatal instability.

Phase 4 (poll flexion): She develops a moderate compression of the epiglottis near the base on the right side, and mild on the left side (Figure 4). It still seems as the basihyoid bone is compressing this region.

Phase 5: Here the base of the epiglottis returns to original position (Figure 5) before she develops mild palatal instability.

Phase 6 (poll flexion): She develops moderate compression of the epiglottis near the base, especially on the right side again.

Phase 7: The examination ends.

She had earned 3000 NOK and did not start again after treadmill examination (appendix 14).

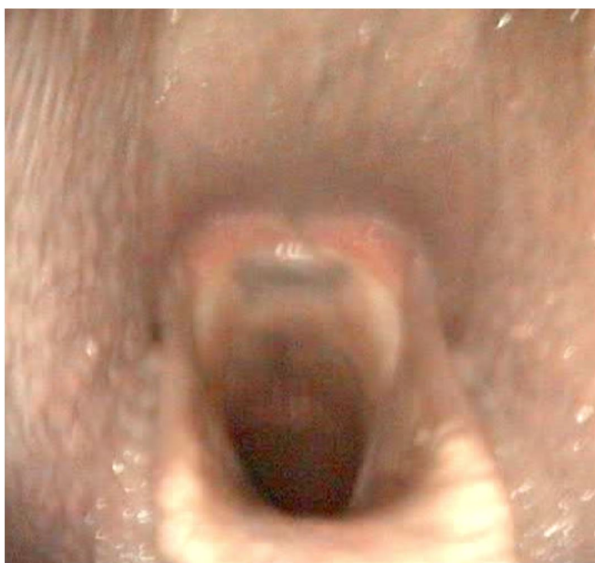


Figure 1: Phase 1. Normal larynx.

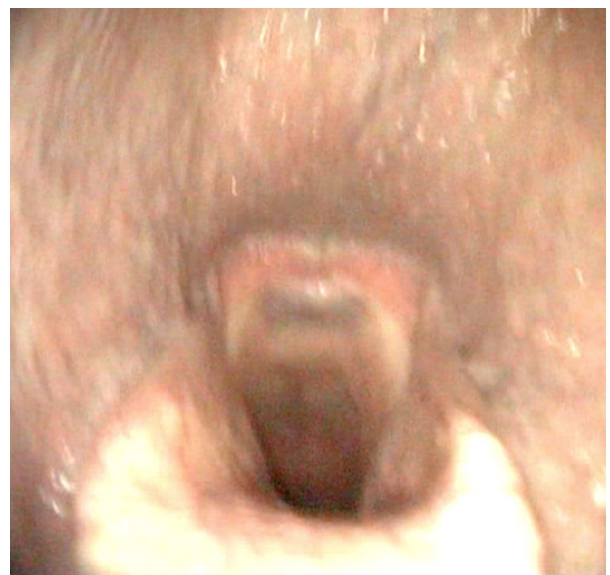


Figure 2: Phase 2. Moderate compression of the epiglottis near the base, especially on the right side



Figure 3: Phase 3. The base of the epiglottis returns to original position.

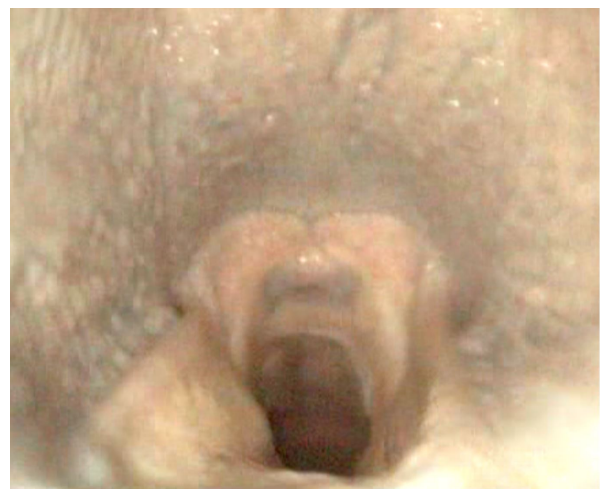


Figure 4: Phase 4. Moderate compression of the epiglottis near the base on the right side and mild on the left side.



Figure 5: Phase 5. The base of the epiglottis has returned to original position.

Time for Money (15)

Time for Money was a 3-year-old STB colt. He was referred to the clinic 19.3.2018. He was described as a very talented 3-year old, and he did well in races, but towards the end he grabbed the bit with his teeth and was difficult to drive. During this period he seemed to lose ground, but when the bit was released he seemed to get his breath back. He had made abnormal respiratory noises when driven on the bit.

He was examined on the treadmill 20.3.2018.

The treadmill test was done with pressure measurements, but the sensors may been plugged.

The treadmill examination:

Rest: Mild pharyngeal hyperplasia.

Phase 1: DDSP several times, displaces and replaces, otherwise the larynx looks normal (Figure 1).

Phase 2 (poll flexion): Marked unilateral compression of epiglottis near the base of the left side (Figure 2). Also mild to moderate loss of arytenoid abduction.

Phase 3: Moderate left sided compression of the base of the epiglottis (Figure 3). It looks like the phase goes over in poll flexion with more marked compression, before the base of the epiglottis returns to original position (Figure 4).

According to journal, the slow-motion review of the video would seem to indicate that the compression of the left base of the epiglottis is what is causing the majority of airway obstruction during pull flexion.

Very hard to get good pictures from the video because of the pressure measurement. A period it is hard to see changes because the video shows much soft palate and nasopharyngeal roof.

He had a relatively wide intermandibular space, and when driven on the treadmill he ran with his head and neck in a very high position. The trainer was recommended to try equipment changes, such as throat plate, martingale and long check reins. We wished to test again after several weeks for new pressure measurements, but this was not done according to the journal.

Average pressure measurements of last 10 breaths of each phase in cmH₂O from 20.03.2018.

(-) denotes inspiration

Phase 1 Damped- non-accurate

Phase 2 -28.60 +15.16

Phase 3 -27.33 +14.42

Phase 4 -35.74 +16.59

Phase 5 -26.83 +14.47

Phase 6 -41.22 +17.45

Before the treadmill examination he had earned 100 635 NOK in harness racing, afterward the examination 163 551 NOK (appendix 15).



Figure 1: Phase 1. Normal larynx.



Figure 2: Phase 2. Marked compression of epiglottis near the base of the left side.



Figure 3: Phase 3. Moderate compression of the epiglottis near the base on the left side. Mild loss of arytenoid abduction.

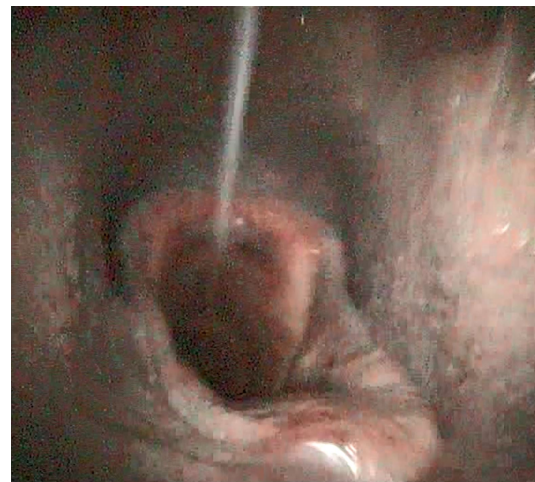


Figure 4: Phase 3. The arytenoid cartilages and the base of the epiglottis have returned to original positions.

Discussion

In our study we reviewed 15 horses, among these 5 STB and 10 NCT. Among the STB horses there were three females and two males. Among the NCTs there were four females and six males. There did not appear to be an obvious gender predisposition in harness racehorses diagnosed with compression of the epiglottis. However, in this population there seemed to be a higher incidence of NCTs versus STBs.

Eight of the 15 horses were referred due to abnormal respiratory sounds in training and/or racing (Table 2). Two of these horses had in addition a history of poor performance. Three of these 8 horses made abnormal respiratory noises especially when driven onto the bit. Five of the 15 horses presented due to poor performance only. The last two horses were referred due to other reasons (Table 2).

Based on the results presented in Table 3, it could seem that the STBs were more likely to present with unilateral compression and NCTs with bilateral compression of the epiglottis. A possible cause of unilateral compression is that the horses head was not straight when driven, but it is not likely that this would create such differences between the breeds. Additionally, the driver of the horses always attempted to drive the horse evenly onto the bit as much as possible on the treadmill. Another potential cause is anatomical differences between the two breeds in the conformation of the hyoid apparatus or in the region where the thyrohyoid bone projects caudally towards the thyroid cartilages to form a movable joint.

As we can see in Table 3, two of the horses had a mild compression of the epiglottis, nine of the horses had moderate compression, and four of the horses had marked compression. We

can see in Table 2 and 3, neither compression of the epiglottis nor dorsomedial deviation of the epiglottic margins appeared in any of the horses in our study population in phase 1. Both of these diagnoses first appeared in phase 2 in all 15 horses, and as it seemed in the videos, it appeared as if there was exterior compression from the hyoid apparatus on the lateral pharyngeal walls which compressed the larynx and base of epiglottis. This compression also made the larynx appear narrower. We believe it is the thyrohyoid bone articulation with the thyroid cartilage that was pushing inwards during poll flexion phases, resulting in compressing the epiglottic region. Both compression of the epiglottis and dorsomedial deviation of the epiglottic margins resolved in the phases of free head carriage in most of these horses. In six of the horses (three NCTs and three STBs), compression of the epiglottis did not resolve fully in the phases of free head carriage, but was present in a milder form (Table 3). In three of the horses (two NCTs and one STB), dorsomedial deviation of the epiglottic margins did not completely resolve in the free head carriage phase but was present in a milder form (Table 3). This supports the belief that this is a poll flexion dependent disorder, resulting in local conformational changes in predisposed horses that results in external compression. A possible cause of a milder form of compression during free head carriage is that the horses still ran with their head in a slight degree of poll flexion naturally, or that they ran aggressively on the treadmill causing the person who held the horse on the treadmill with a rope attached to the noseband to pull the horses backwards to avoid them from running into the front chest barrier of the treadmill.

We cannot see any difference between the horses or the two racing breeds when it comes to severity of the condition. This creates a thought that compression near the base of the epiglottis is a breed independent disorder in trotters and that instead similar local anatomic phenotypes and position of head carriage play a central role. Possible contributing factors

could be a narrow intermandibular space and exercising in a position of high poll flexion due to the check rein, as is seemingly the case with dynamic laryngeal collapse associated with poll flexion.

Of other dynamic URT diagnoses, aryepiglottic fold collapse occurred most often. This condition was registered in ten horses (Table 2). Which phase it was first seen in varied among the horses, but for the majority it persisted thereafter during both the free head carriage and poll flexion phases until the end of the exercise test.

Mild bilateral loss of arytenoid cartilage abduction was noted in three horses, both during free head carriage and poll flexion in two of the horses (Table 2) and only during poll flexion in one horse (horse nr. 14).

Dorsal displacement of the soft palate occurred in five horses (Table 2). In two of the horses it only occurred during the first phase (horse nr. 13 and 15) and in both of these cases, the horses had tracheal pressure measurements as a part of the treadmill examination. It can therefore seem as the equipment used to measure the inspiratory tracheal pressure can induce dorsal displacement of the soft palate in horses during the initial stages of the evaluation that do not have this disorder normally. These 2 horses did not demonstrate further DDSP after the 1st phase of the evaluation.

Palatal instability was noted in six horses (Table 2).

Only one horse (horse nr. 6) had compression of the base of the epiglottis diagnosed as the only URT abnormality.

Due to the early onset of the compression near the base of the epiglottis, and that the other conditions in general came later, we assume that this condition is a risk factor for inducing the other dynamic URT abnormalities. This means that the compression of the base of the epiglottis is the primary problem, and that the other conditions in general are secondary problems due to consequences of the compression. Two examples of possible consequences of the compression is slack (less tight) aryepiglottic folds or an increase in mean inspiratory tracheal pressure as seen in horse nr. 15, where no other disorders could explain this significant increase in negative inspiratory tracheal pressure. As described in the introduction, it has previously been demonstrated that poll flexion during strenuous exercise causes a further increase in mean inspiratory tracheal pressure in both normal racehorses, and racehorses affected with URT disorders (Petche et al. 1995; Strand et al. 2009). However, the inspiratory tracheal pressure had a milder change in the normal racehorses relative to those horses affected with dynamic laryngeal collapse (Strand et al. 2009). This could explain why most of the horses with compression of the epiglottis were more likely to have additional dynamic URT disorders, as previous suggested by Strand et al. (2009). This is in agreement with our assumption that increased inspiratory tracheal pressure due to compression of the epiglottis may cause secondary disorders through the Bernoulli principle and Venturi effect.

As seen in Table 4, only one horse had greater earnings after surgery than before (horse nr. 11). In this case, surgery was performed to treat the additional diagnoses of dorsal dislocation of the soft palate. Additionally, equipment changes were recommended for dorsomedial deviation of the epiglottic margins and compression near the base of the epiglottis.

The two horses with higher earnings after treadmill examinations (horse nr. 5 and 15) were recommended equipment changes only (Table 5). This may indicate that the most effective treatment for compression near the base of the epiglottis are management/ equipment changes to limit poll flexion.

The importance of this new disorder is currently unknown. However, it is an important new condition that needs to be taken into account when evaluating horses for dynamic URT disorders. The pathogenesis is unknown, but as earlier mentioned, believed to be a poll flexion dependent external compression of the larynx/epiglottis due to the articulation of the thyrohyoid bone on the cranial aspect of the thyroid cartilage. A further description of this hypothesis with focus on risk factors in these horses, will be necessary to understand the condition completely, and to develop treatment options with higher success rates. The goal should be that the horses get sufficient air during harness racing, and that more horses return to successful racing after diagnosis of the condition. Since there presently is no adequate surgical treatment, management changes to prevent poll flexion seems to be the best approach to limiting the effects of the disorder on racing performance.

Conclusions

The compression near the base of the epiglottis appears to be a result of external compression of the hyoid apparatus during poll flexion in susceptible horses. This adds pressure on the pharyngeal walls which in turn compress the base of the epiglottis and also often causing a narrow appearing laryngeal lumen in this area. We believe that the compression near the base of the epiglottis in the horses in our study is the primary problem, and that other dynamic URT conditions occurs secondary as a consequence. There is presently no surgical treatment, and conservative management/ equipment changes to limit poll flexion seems to be the best

way of approaching treatment. Further research is necessary to establish the importance of this condition in harness racehorse breeds such as the STB and NCT.

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Sammendrag

Tittel: Unilateral og bilateral kompresjon av epiglottis under nakkefleksjon hos løpshester

Forfattere: Anna Emilie Klemsdal, Gina Margrete Roen

Veileder: Eric Strand, Institutt for sports- og familiedyrmedisin (sportfamed)

Målsetting: Å beskrive en hittil ukjent lidelse av epiglottis hos løpshest og forstå noe av patogenesen bak, samt se hvorvidt denne lidelsen har en klinisk relevans.

Metode: Retrospektiv studie av 15 varmblodstravere og kaldblodstravere som ble referert til NVH av ulik årsak.

Resultat: De fleste hester som har denne lidelsen, utvikler også andre øvre luftveislidelser. Dette viser seg ofte etter kort tid under en hard treningsøkt. Per i dag finnes det ingen kirurgiske behandlingsalternativer. Den viktigste behandlingen vi kan tilby per nå er å prøve og motvirke nakkefleksjon, og på denne måten motvirke en ekstern kompresjon av larynx.

Konklusjon: Kompresjon av epiglottis under nakkefleksjon hos løpshester er en primær øvre luftveislidelse som kan predisponere for sekundære øvre luftveislidelser.

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Appendix

Appendix 1: Horse- and race information for Alm Vilter.

The black line indicates time of the treadmill examination.

Alm Vilter (Kaldblods travser)

N-06-0625(110) f. 2006 mørkbr vallak Tot. 43- 1- 2- 8- 12 (8)28,1K - (8)26,8aK Kr. 95.181
Eier: Hakon Gulliksen, SKREIA Oppdr: Knut Alm, JAREN

Karriere	Starter	Status	Stamtavle		Direktelink								
Kusknavn	Banavn	Dato	Løp	Dist.	Spor	Prog.nr	I	Tid	Plas.	R	G	Odds	Premie
Knut Arne Ødegaard	Klosterskogen Travbane	01.12.2014	<u>04</u>	1 700	8	08		32,5a	00		G	347	0,-
Ole-Christian Kjenner	Bjerke Travbane	21.11.2014	<u>02</u>	1 660	11	13		31,4	00			192	0,-
Knut Arne Ødegaard	Klosterskogen Travbane	23.10.2014	<u>03</u>	1 700	9	09		28,3a	04			180	3 000,-
Ole-Christian Kjenner	Bjerke Travbane	16.10.2014	<u>02</u>	2 100	8	08		32,5a	06			311	2 000,-
Ole-Christian Kjenner	Bjerke Travbane	10.09.2014	<u>05</u>	1 660	2	04		28,7	00			364	0,-
Ole-Christian Kjenner	Amål	28.08.2014	<u>06</u>	1 680	8	06		26,8a	03			272	5 887,-
Knut Arne Ødegaard	Drammen Travbane	19.08.2014	<u>03</u>	2 100	4	04		31,7	00			304	0,-
Ole-Christian Kjenner	Jarlsberg Travbane	08.08.2014	<u>04</u>	1 600	4	04		29,6	04			170	3 000,-
Ole-Christian Kjenner	Biri Travbane	27.07.2014	<u>03</u>	1 609	11	11		STR	-			0	0,-
Knut Arne Ødegaard	Biri Travbane	13.06.2014	<u>05</u>	1 609	10	10		32,7a	00			169	0,-
Knut Arne Ødegaard	Jarlsberg Travbane	25.05.2014	<u>03</u>	1 600	8	08		28,1	03			395	5 000,-
Knut Arne Ødegaard	Jarlsberg Travbane	16.05.2014	<u>07</u>	2 120	5	12		29,4	07			643	2 000,-
Knut Arne Ødegaard	Drammen Travbane	14.04.2014	<u>03</u>	2 120	7	13		33,3	00		G	75	0,-
Knut Arne Ødegaard	Bjerke Travbane	10.04.2014	<u>04</u>	2 100	1	02		32,7a	03			325	4 000,-
Knut Arne Ødegaard	Jarlsberg Travbane	21.02.2014	<u>07</u>	1 609	6	07		31,8a	00			171	0,-
Knut Arne Ødegaard	Momarken Travbane	05.01.2014	<u>02</u>	2 140	6	06		33,2a	00		G	288	0,-
Knut Arne Ødegaard	Bjerke Travbane	29.12.2013	<u>08</u>	2 140	6	06		32,0	02			159	7 500,-
Knut Arne Ødegaard	Biri Travbane	20.12.2013	<u>03</u>	1 620	1	06		32,3	06			135	2 000,-
Knut Arne Ødegaard	Bjerke Travbane	11.12.2013	<u>06</u>	2 140	5	05		32,7	00			987	0,-
Knut Arne Ødegaard	Momarken Travbane	01.12.2013	<u>04</u>	2 160	2	08		32,4	03			144	5 000,-
Knut Arne Ødegaard	Bjerke Travbane	01.11.2013	<u>08</u>	2 160	5	07		33,3	05			98	2 500,-
Knut Arne Ødegaard	Biri Travbane	20.10.2013	<u>05</u>	1 620	5	08		32,5	02			397	7 500,-
Knut Arne Ødegaard	Drammen Travbane	03.10.2013	<u>04</u>	2 100	12	12		STR	-			0	0,-
Knut Arne Ødegaard	Momarken Travbane	17.09.2013	<u>08</u>	1 640	6	06		dg	-			95	0,-
Knut Arne Ødegaard	Momarken Travbane	02.09.2013	<u>01</u>	1 640	9	09		32,0a	03			71	5 000,-
Knut Arne Ødegaard	Biri Travbane	16.08.2013	<u>03</u>	2 120	5	11		37,8	08			285	2 000,-
Knut Arne Ødegaard	Jarlsberg Travbane	10.07.2013	<u>05</u>	2 120	7	15		33,6	00		G	1083	0,-
Knut Arne Ødegaard	Momarken Travbane	02.07.2013	<u>05</u>	2 140	9	09		brg	-		G	339	0,-
Knut Arne Ødegaard	Arvika	23.06.2013	<u>05</u>	2 140	8	03		35,0	08		G	73	1 512,-
Knut Arne Ødegaard	Momarken Travbane	02.06.2013	<u>04</u>	2 140	8	08		31,6a	08		G	220	2 000,-
Knut Arne Ødegaard	Biri Travbane	12.04.2013	<u>09</u>	2 120	7	12		34,8	00		G	36	0,-
Knut Arne Ødegaard	Färjestad	18.03.2013	<u>03</u>	2 180	14	04		32,8	01			96	14 282,-
Knut Arne Ødegaard	Klosterskogen Travbane	21.02.2013	<u>04</u>	2 120	9	11		34,2	03			54	5 000,-
Knut Arne Ødegaard	Drammen Travbane	11.02.2013	<u>04</u>	2 120	8	13		35,2	04		G	133	3 000,-
Knut Arne Ødegaard	Bjerke Travbane	25.10.2012	<u>03</u>	2 100	8	08		dg	-			43	0,-
Knut Arne Ødegaard	Momarken Travbane	16.10.2012	<u>03</u>	2 160	5	07		34,6	03			176	4 000,-
Andre H. Stensen	Momarken Travbane	02.10.2012	<u>01</u>	2 160	3	09		STR	-			0	0,-
Eirik Høitomt	Bjerke Travbane	22.08.2012	<u>09</u>	2 160	6	11		37,7	00			91	0,-
Eirik Høitomt	Biri Travbane	03.08.2012	<u>01</u>	2 120	3	10		34,6	03			22	4 000,-
Kai Johansen	Biri Travbane	19.07.2012	<u>07</u>	2 120	1	06		dg	-			93	0,-
Kai Johansen	Jarlsberg Travbane	06.07.2012	<u>01</u>	2 120	7	15		dg	-			425	0,-
Kai Johansen	Momarken Travbane	26.06.2012	<u>04</u>	2 140	5	05		36,4	06		G	32	2 000,-
Kai Johansen	Biri Travbane	08.06.2012	<u>21</u>	2 100	2	02		34,0	-			P	0,-
Øyvind Ruttenborg	Momarken Travbane	05.04.2012	<u>01</u>	2 160	3	12		dg	-			353	0,-
Andre H. Stensen	Momarken Travbane	06.03.2012	<u>07</u>	2 140	4	04		dg	-			62	0,-
Øyvind Ruttenborg	Biri Travbane	20.01.2012	<u>01</u>	2 120	10	13		dg	-			185	0,-
Øyvind Ruttenborg	Biri Travbane	06.01.2012	<u>01</u>	2 100	3	03		37,1	04		G	186	3 000,-
Øyvind Ruttenborg	Biri Travbane	16.12.2011	<u>20</u>	2 120	4	07		37,8	-		G	P	0,-

Appendix 2: Horse- and race information for Conch Shot

Conch Shot (Varmblods travrer)

N-01-5265 f. 2001 Død brun hingst Tot. 7- 1- 0- 0- 3 (4)*20,7M - (6)16,6aK Kr. 17.700
 Eier: Allan Bråtlund, GRIMSTAD Oppdr: Ann Berit Sagedal, EVJE

Karriere		Starter		Stamtavle		Direktelink							
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	I	Tid	Plas.	R	G	Odds	Premie
Olav Mikkelborg	Bjerke Travbane	22.05.2007	02	1 609	11	11		brg	-	G	182		0,-
Olav Mikkelborg	Bjerke Travbane	03.05.2007	04	1 609	6	06		16,6a	04		34		2 500,-
Olav Mikkelborg	Momarken Travbane	17.04.2007	01	2 140	5	05		17,9a	04		117		2 200,-
Olav Mikkelborg	Bjerke Travbane	07.03.2007	20	2 140	5	05		21,9	-		P		0,-
Olav Mikkelborg	Bjerke Travbane	21.02.2007	20	2 140	1	01		27,2	-	G	N		0,-
Olav Mikkelborg	Biri Travbane	23.09.2005	02	2 100	3	03		dg	-		0053		0,-
Olav Mikkelborg	Bjerke Travbane	07.09.2005	04	2 100	4	04		18,3a	04		0053		3 000,-
Olav Mikkelborg	Klosterskogen Travbane	25.08.2005	07	2 100	10	10		dg	-		0113		0,-
Olav Mikkelborg	Biri Travbane	05.08.2005	01	2 100	9	09		20,7	01		0073		10 000,-
Olav Mikkelborg	Biri Travbane	24.07.2005	P	2 100	3	03		20,4	-		P		0,-

Appendix 3: Horse- and race information for Super Jo

Super Jo (Kaldblods travrer)

N-02-0927(106) f. 2002 Død mørkbr hingst
 Eier: Svein Stormyr & Tone Solbakken, ORKANGER Oppdr: Øystein Lura, ,

Starter		Stamtavle		Utstilling							Direktelink		
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	I	Tid	Plas.	R	G	Odds	Premie
Thor Borg	Jarlsberg Travbane	09.09.2005	01	2 100	1	01			-				0,-
Eirik Høitomt	Momarken Travbane	27.03.2005	P	2 000	2	02		44,1	-		B		4 000,-
Eirik Høitomt	Jarlsberg Travbane	18.03.2005	P	2 100	9	09		44,0	-		B		4 000,-

Appendix 4: Horse- and race information for Budalsguten

Budalsguten (Kaldblods travrer)

N-05-0695(104) f. 2005 Død svart vallak Tot. 10- 0- 2- 1- 3 (3)32,6M - (3)33,8aM Kr. 27.116
 Eier: Sverre Brudal, BUDALEN Oppdr: Bente Brudal, BUDALEN

Karriere		Starter		Status		Stamtavle							Direktelink	
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	I	Tid	Plas.	R	G	Odds	Premie	
Karl Ove Nordtømme	Biri Travbane	24.10.2008	06	2 100	4	04		STR	-		0		0,-	
Karl Ove Nordtømme	Leangen Travbane	13.10.2008	07	2 160	1	04		dg	-		107		0,-	
Karl Ove Nordtømme	Biri Travbane	12.09.2008	03	2 120	6	13		34,1	04		650		5 000,-	
Andre H. Stensen	Leangen Travbane	25.08.2008	01	2 180	3	08		34,2	04	G	120		3 000,-	
Gunnar Austevoll	Drammen Travbane	18.08.2008	04	2 100	1	01		dg	-		41		0,-	
Andre H. Stensen	Leangen Travbane	28.07.2008	01	2 180	2	09		32,6	03		207		4 000,-	
Andre H. Stensen	Biri Travbane	18.07.2008	08	2 100	7	08		33,8a	00	G	312		0,-	
Karl Ove Nordtømme	Leangen Travbane	09.06.2008	01	2 180	1	07		36,7	00	G	116		0,-	
Karl Ove Nordtømme	Leangen Travbane	28.04.2008	07	2 160	1	03		36,4	02	G	225		7 000,-	
Bjørn Åge Velva	Leangen Travbane	21.04.2008	23	2 160	2	10		STR	-				0,-	
Bjørn Åge Velva	Leangen Travbane	14.04.2008	23	2 140	2	02		STR	-				0,-	
Karl Ove Nordtømme	Leangen Travbane	30.03.2008	01	2 140	4	04		38,7	02	G	149		6 000,-	
Harald Johnsen	Östersund	21.03.2008	01	2 140	2	01		39,7	04		247		2 116,-	
Harald Johnsen	Leangen Travbane	10.03.2008	23	2 140	5	05		41,0	-		P		0,-	
Jarle Morten Søromo	Orkdal Tråvpark	05.05.2007	25	2 100	3	03		57,0	-		B		0,-	

Appendix 5: Horse- and race information for Fatima L.

The black line indicates time of the treadmill examination.

Fatima L. (Varmblods travet)N-05-5080 f. 2005 Død mørkbr hoppe Tot. 11- 2- 0- 1- 3 (4)17,7M - (4)14,8aK Kr. 75.000
Eier: Jostein Lea, SOLA Oppdr: Dag Lea, KLEPPE Psevd: Stall Lea Avlssenter

Karriere		Starter		Stamtavle		Direktelink							
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Thor Borg	Jarlsberg Travbane	26.06.2009	<u>05</u>	1 609	11	11		14,8a	00			636	0,-
Geir Vegard Gundersen	Klosterskogen Travbane	11.06.2009	<u>05</u>	1 700	11	11		18,6	06			379	2 000,-
Geir Vegard Gundersen	Biri Travbane	03.06.2009	<u>03</u>	2 100	11	10		STR	-			0	0,-
Geir Vegard Gundersen	Biri Travbane	27.05.2009	<u>05</u>	2 100	13	11		19,5a	00			295	0,-
Åsbjørn Tengsareid	Forus Travbane	21.04.2009	<u>09</u>	2 060	3	05		17,7	00			151	0,-
Åsbjørn Tengsareid	Forus Travbane	07.04.2009	<u>09</u>	2 040	9	09		dg	-			87	0,-
Åsbjørn Tengsareid	Forus Travbane	24.03.2009	<u>03</u>	1 600	1	01		STR	-			0	0,-
Vidar Hop	Drammen Travbane	10.01.2009	<u>10</u>	2 500	1	01		19,7	00			44	0,-
Vidar Hop	Momarken Travbane	27.12.2008	<u>05</u>	2 140	3	03		18,2a	03			87	25 000,-
Åsbjørn Mehla	Bjerke Travbane	26.11.2008	<u>01</u>	2 100	1	01		17,3a	06			117	2 000,-
Åsbjørn Mehla	Klosterskogen Travbane	13.11.2008	<u>06</u>	2 100	9	09		18,9a	01			120	30 000,-
Vidar Hop	Bjerke Travbane	22.10.2008	<u>01</u>	2 140	7	07		18,8	01			57	14 000,-
Vidar Hop	Jarlsberg Travbane	10.10.2008	<u>08</u>	2 100	12	12		21,4	07	G		157	2 000,-
Vidar Hop	Bjerke Travbane	01.10.2008	<u>23</u>	2 140	4	04		23,0	-		P		0,-
Vidar Hop	Jarlsberg Travbane	28.09.2007	<u>22</u>	2 100	6	06		29,2	-	G	B		0,-

Appendix 6: Horse- and race information for Verdandi.**Verdandi (Kaldblods travet)**N-07-0048(111) f. 2007 Død mørkbr hoppe Tot. 14- 0- 1- 1- 5 (6)34,1M - (6)34,5aM Kr. 24.500
Eier: Aina Skar & Geir Aga, SKOTSELV Oppdr: Svein Knut Granum, VIKERSUND

Karriere		Starter		Status		Stamtavle		Direktelink					
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Dag-Sveinung Dalen	Drammen Travbane	17.02.2014	<u>05</u>	2 120	4	09		dg	-	R		410	0,-
Vidar Hop	Drammen Travbane	07.10.2013	<u>05</u>	2 100	6	06		35,2	00			157	0,-
Vidar Hop	Klosterskogen Travbane	16.09.2013	<u>03</u>	2 100	5	05		34,7	02			534	7 500,-
Geir Aga	Drammen Travbane	15.07.2013	<u>04</u>	2 520	3	06		dg	-			1091	0,-
Hans Chr. Holm	Drammen Travbane	01.07.2013	<u>02</u>	2 100	8	08		dg	-			295	0,-
Geir Aga	Jarlsberg Travbane	07.06.2013	<u>05</u>	2 100	6	06		34,1	00			854	0,-
Vidar Hop	Drammen Travbane	30.05.2013	<u>02</u>	2 100	7	08		35,0a	04	G		385	3 000,-
Vidar Hop	Drammen Travbane	25.04.2013	<u>03</u>	2 100	9	09		34,5a	04			70	3 000,-
Lars Anvar Kolle	Drammen Travbane	08.04.2013	<u>05</u>	2 100	3	03		35,4	03			142	5 000,-
Lars Anvar Kolle	Drammen Travbane	04.09.2012	<u>03</u>	2 100	10	10		40,1a	08	R	G	512	2 000,-
Ole Johan Østre	Jarlsberg Travbane	06.07.2012	<u>01</u>	2 120	3	11		dist	00	G		947	0,-
Tom Erik Solberg	Jarlsberg Travbane	22.06.2012	<u>08</u>	2 100	6	06		34,4	09			137	2 000,-
Ole Johan Østre	Klosterskogen Travbane	14.06.2012	<u>01</u>	2 100	1	01		37,9	06			423	2 000,-
Truls Desserud	Momarken Travbane	05.06.2012	<u>01</u>	2 140	2	02		dg	-			812	0,-
Ole Johan Østre	Jarlsberg Travbane	18.05.2012	<u>24</u>	2 120	3	11		38,0	-		P		0,-
Frode Hamre	Jarlsberg Travbane	10.09.2010	<u>01</u>	2 100	4	04		STR	-			0	0,-
Kristine Kvasnes	Jarlsberg Travbane	25.06.2010	<u>20</u>	2 120	1	10		40,7	-	G	P		0,-
Geir Flåten	Bjerke Travbane	30.12.2009	<u>21</u>	1 640	6	06		STR	-				0,-
Geir Flåten	Jarlsberg Travbane	18.12.2009	<u>20</u>	2 120	2	08		08,5	-	R	N		0,-

Appendix 7: Horse- and race information for Miller Mollyn.

Miller Mollyn (Kaldblods travet)

N-04-0313(117) f. 2004 Død brun vallak Tot. 26- 0- 3- 2- 12 (4)32,7M - (5)30,9aK Kr. 52.000
 Eier: Roger Kristiansen, BORGENHAUGEN Oppdr: Elisabeth Hjørnerød, FREDRIKSTAD

Karriere		Starter		Stamtavle		Direktelink							
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Ole-Christian Kjenner	Kala Travpark	10.08.2010	<u>02</u>	1 900	11	11		32,0a	00			316	0,-
Ole-Christian Kjenner	Momarken Travbane	25.05.2010	<u>04</u>	2 140	6	06		37,7	00			101	0,-
Ole-Christian Kjenner	Momarken Travbane	01.12.2009	<u>05</u>	2 140	1	01		34,4a	00			239	0,-
Cato Antonsen	Biri Travbane	23.10.2009	<u>07</u>	1 609	1	01		31,1a	00			191	0,-
Cato Antonsen	Drammen Travbane	12.10.2009	<u>05</u>	1 700	3	03		33,1a	07			196	2 000,-
Cato Antonsen	Bjerke Travbane	17.09.2009	<u>02</u>	1 609	1	01		30,9a	00			90	0,-
Vidar Hop	Momarken Travbane	02.06.2009	<u>07</u>	2 140	1	01		STR	-			-	0,-
Tom Erga	Forus Travbane	27.01.2009	<u>02</u>	2 060	4	05		brg	-	G		819	0,-
Per Arvid Erga	Forus Travbane	24.01.2009	<u>05</u>	2 040	5	05		brg	-	G		1548	0,-
Tom Erga	Forus Travbane	13.01.2009	<u>02</u>	2 080	4	07		32,8	06			114	2 000,-
Tom Erga	Forus Travbane	30.12.2008	<u>01</u>	2 060	1	01		33,5	03			211	4 000,-
Tom Erga	Sørlandets Travpark	21.12.2008	<u>04</u>	2 140	4	04		35,2	06			93	2 000,-
Tom Erga	Forus Travbane	16.12.2008	<u>02</u>	2 080	5	12		36,8	07			141	2 000,-
Tom Erga	Forus Travbane	13.12.2008	<u>04</u>	1 600	5	05		34,7	05			122	5 000,-
Tom Erga	Forus Travbane	25.11.2008	<u>10</u>	2 060	1	02		32,7	02			183	6 000,-
Lars Tore Hauge	Bergen Travpark	22.05.2008	<u>11</u>	2 160	2	08		STR	-			0	0,-
Lars Tore Hauge	Bergen Travpark	15.05.2008	<u>02</u>	2 100	3	03		35,4	07			185	2 000,-
Tom Erga	Bergen Travpark	03.05.2008	<u>01</u>	2 100	5	05		35,7a	00			40	0,-
Tom Erga	Forus Travbane	22.04.2008	<u>03</u>	2 040	7	08		35,1a	05			70	2 000,-
Tom Erga	Forus Travbane	11.03.2008	<u>01</u>	2 040	1	01		34,3	02			60	6 000,-
Tom Erga	Sørlandets Travpark	09.03.2008	<u>07</u>	2 160	3	08		35,7	04			75	2 500,-
Tom Erga	Forus Travbane	26.02.2008	<u>10</u>	2 060	3	07		35,0	03			31	4 000,-
Per Arvid Erga	Forus Travbane	04.12.2007	<u>01</u>	2 040	6	06		35,0	04			372	6 000,-
Tom Erga	Forus Travbane	20.11.2007	<u>01</u>	2 040	2	02		38,6	05			103	2 000,-
Tom Erga	Sørlandets Travpark	03.07.2007	<u>01</u>	2 160	1	08		36,1	08			377	1 000,-
Tom Erga	Forus Travbane	05.06.2007	<u>01</u>	2 040	2	02		36,3	06	G		540	1 500,-
Tom Erga	Forus Travbane	15.05.2007	<u>01</u>	2 040	2	02		39,3	02			104	2 000,-
Ove Bakkevold Reime	Biri Travbane	15.12.2006	<u>01</u>	1 600	5	05		44,3	00	G		254	0,-
Cato Antonsen	Bjerke Travbane	06.09.2006	<u>P</u>	2 160	3	03		52,4	-			B	0,-
Stian Eilefsen	Bjerke Travbane	30.08.2006	<u>P</u>	2 160	6	06		46,7	-			B	0,-

Appendix 8: Horse- and race information for Holter Frigge.

Holter Frigge (Kaldblods travet)

N-03-0934(107) f. 2003 brun hoppe Tot. 84- 3- 2- 9- 31 (8)30,2K - (8)26,8aK Kr. 179.900
 Eier: Guro Breie & Tarjei Breie, HOL Oppdr: Kjell Dolvik, FETSUND Psevd: Stall Holter

Avkom	Karriere	Starter	Stamtavle		Utstilling		Direktelink						
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Olav Mikkelborg	Bjerke Travbane	16.02.2012	04	2 100	9	10		br	-			500	0,-
Hans Chr. Holm	Bjerke Travbane	26.10.2011	05	1 640	1	01		br	-			813	0,-
Jomar Blekkan	Biri Travbane	14.10.2011	06	1 600	2	02		30,2	06	G		267	2 000,-
Kristian Malmin	Drammen Travbane	03.10.2011	09	2 120	1	02		30,6	07			262	2 000,-
Elisabeth Jensen	Drammen Travbane	19.09.2011	08	1 720	3	04	M	30,8	01			115	14 000,-
Kristian Malmin	Bjerke Travbane	24.08.2011	03	1 609	7	07		28,0a	00			484	0,-
Kristian Malmin	Drammen Travbane	16.08.2011	01	2 100	4	04		31,0a	05			205	2 500,-
Elsie Hafskjold	Klosterskogen Travbane	06.08.2011	01	2 100	5	05	M	30,1a	03			82	4 000,-
Kristian Malmin	Klosterskogen Travbane	18.07.2011	08	1 700	9	09		g0	-			164	0,-
Mats Gunnar Ringberg	Momarken Travbane	09.07.2011	11	2 140	7	07		28,1a	04			214	3 000,-
Kristian Malmin	Bjerke Travbane	23.06.2011	04	1 609	4	04		26,8a	04			166	3 000,-
Kai Johansen	Bjerke Travbane	04.05.2011	07	2 100	6	06		34,0a	00	G		248	0,-
Elsie Hafskjold	Klosterskogen Travbane	12.02.2011	01	1 700	7	07	M	30,5a	06			87	2 000,-
Geir Vegard Gundersen	Biri Travbane	28.01.2011	08	1 609	11	11		30,8a	00			350	0,-
Mette R. Nyløkken	Bjerke Travbane	19.01.2011	21	2 160	1	03	M	34,9	-		P		0,-
Geir Vegard Gundersen	Bjerke Travbane	01.01.2011	02	1 609	7	07		30,9a	06			808	2 000,-
Kai Johansen	Momarken Travbane	14.12.2010	08	2 140	7	07		33,6a	06	G		321	2 000,-
Kai Johansen	Bjerke Travbane	01.12.2010	03	1 609	11	11		30,7a	06			671	2 000,-
Erik Killingmo	Biri Travbane	29.10.2010	03	1 609	9	09		33,2a	05			612	2 500,-
Kai Johansen	Bjerke Travbane	21.10.2010	02	1 609	10	10		31,2a	00			402	0,-
Hans Chr. Holm	Jarlsberg Travbane	01.10.2010	03	2 100	8	08		30,8	00			690	0,-
Erik Killingmo	Biri Travbane	25.07.2010	09	2 100	2	02		br	-			308	0,-
Hans Jørgen Eggen	Bjerke Travbane	09.06.2010	02	1 609	1	01		30,7a	05			158	4 000,-
Kai Johansen	Biri Travbane	04.06.2010	04	1 609	2	02		29,5a	00			125	0,-
Kai Johansen	Drammen Travbane	02.05.2010	09	2 120	2	06		30,7	06			263	2 000,-
Kai Johansen	Drammen Travbane	17.04.2010	06	2 100	5	05		brg	-	G		155	0,-
Kai Johansen	Bjerke Travbane	31.03.2010	08	1 640	12	12		31,9	01			72	24 000,-
Kai Johansen	Biri Travbane	19.03.2010	04	2 140	3	15		32,9	04			419	3 000,-
Kai Johansen	Bjerke Travbane	03.03.2010	05	2 100	4	04		31,4a	03			292	9 000,-
Kai Johansen	Bjerke Travbane	24.02.2010	03	1 609	5	05		33,4a	00			107	0,-
Kai Johansen	Bjerke Travbane	17.02.2010	02	1 660	9	12		30,8	04			517	5 000,-
Erik Killingmo	Bjerke Travbane	04.02.2010	01	1 609	3	04		31,9a	00			117	0,-
Erik Killingmo	Bjerke Travbane	27.01.2010	02	1 640	1	01		30,9	00			122	0,-
Kai Johansen	Bjerke Travbane	20.01.2010	04	2 140	2	02		32,4	00			748	0,-
Erik Killingmo	Momarken Travbane	12.01.2010	03	1 640	4	04		31,6a	06			65	2 000,-
Erik Killingmo	Bjerke Travbane	26.12.2009	05	1 609	11	11		STR	-				0,-
Erik Killingmo	Bjerke Travbane	10.12.2009	04	1 609	7	07		31,8a	00			119	0,-
Kai Johansen	Bjerke Travbane	25.11.2009	01	1 609	3	03		30,6a	03			111	5 000,-
Erik Killingmo	Bjerke Travbane	12.11.2009	04	1 609	4	06		31,2a	00	G		133	0,-
Kai Johansen	Biri Travbane	30.10.2009	07	1 609	5	06		30,2a	01			116	14 000,-
Erik Killingmo	Biri Travbane	23.10.2009	07	1 609	6	06		30,7a	05			312	2 500,-
Erik Killingmo	Biri Travbane	16.10.2009	09	1 600	3	03		31,1	05			460	2 500,-
Erik Killingmo	Bjerke Travbane	07.10.2009	02	1 640	7	07		32,4	00			226	0,-
Erik Killingmo	Biri Travbane	25.09.2009	07	1 620	5	12		30,5	06			201	2 000,-
Erik Killingmo	Biri Travbane	08.09.2009	02	2 100	3	03		dist	00			35	0,-
Erik Killingmo	Biri Travbane	21.08.2009	05	1 609	11	11		28,9a	04			229	3 000,-
Erik Killingmo	Bjerke Travbane	29.07.2009	09	1 609	5	06		31,2a	03			68	5 000,-
Erik Killingmo	Biri Travbane	25.07.2009	07	2 100	10	10		31,2a	00			844	0,-
Hans Chr. Holm	Biri Travbane	19.07.2009	04	2 100	7	07		33,7a	00	G		78	0,-
Kai Johansen	Biri Travbane	26.06.2009	02	2 600	1	01		31,8	03			178	5 000,-
Erik Killingmo	Biri Travbane	19.06.2009	03	1 609	4	06		32,0a	04			182	3 000,-
Kai Johansen	Biri Travbane	27.05.2009	02	1 609	8	08		31,5a	00			341	0,-
Kai Johansen	Bjerke Travbane	14.05.2009	03	1 609	3	03		32,4a	02			110	7 000,-
Kai Johansen	Biri Travbane	05.05.2009	02	1 609	12	12		30,4a	03			333	3 500,-
Olav Mikkelborg	Momarken Travbane	09.04.2009	08	2 140	4	04		33,7a	00			217	0,-
Thor Borg	Bjerke Travbane	19.03.2009	01	1 609	10	10		32,0a	05			357	2 500,-
Tom Erik Solberg	Bjerke Travbane	12.03.2009	02	2 100	1	01		35,2a	05			217	2 500,-
Olav Mikkelborg	Biri Travbane	30.01.2009	02	2 120	5	10		34,8	00			525	0,-
Jens Kristian Brenne	Jarlsberg Travbane	12.12.2008	02	2 100	1	01		35,7	00			176	0,-
Gunnar Austevoll	Biri Travbane	05.12.2008	02	1 620	3	06		31,7	03			216	5 000,-
Olav Mikkelborg	Drammen Travbane	17.11.2008	02	1 720	9	14		33,8	06			91	2 000,-
Magnus Helland	Jarlsberg Travbane	30.05.2008	01	2 100	5	05		dist	00			401	0,-
Geir Flåten	Bjerke Travbane	28.05.2008	01	2 160	1	09		33,3	00			542	0,-
Geir Flåten	Bjerke Travbane	21.05.2008	08	2 180	1	10		36,9	00	G		362	0,-
Geir Flåten	Bjerke Travbane	08.05.2008	03	1 609	9	10		33,4a	00	G		178	0,-
Geir Flåten	Jarlsberg Travbane	25.04.2008	02	2 120	6	10		35,1	00	G		117	0,-
Geir Flåten	Jarlsberg Travbane	18.04.2008	02	2 100	7	07		33,9	00	G		517	0,-
Geir Flåten	Momarken Travbane	15.04.2008	02	1 660	7	14		brg	-	G		162	0,-
Geir Flåten	Drammen Travbane	07.04.2008	04	2 100	11	11		35,5a	00	G		162	0,-

Geir Flåten	Jarlsberg Travbane	28.03.2008	<u>02</u>	2 140	1	05	33,9	04	G	618	2 500,-
Geir Flåten	Momarken Travbane	20.03.2008	<u>03</u>	1 640	10	11	33,2a	06		466	2 000,-
Geir Flåten	Momarken Travbane	12.02.2008	<u>02</u>	2 160	1	08	36,8	00		239	0,-
Geir Flåten	Klosterskogen Travbane	29.11.2007	<u>04</u>	2 120	2	08	40,0	00		253	0,-
Geir Flåten	Jarlsberg Travbane	16.11.2007	<u>05</u>	2 120	6	14	34,4	00		654	0,-
Geir Flåten	Bjerke Travbane	25.10.2007	<u>03</u>	1 609	11	11	32,6a	00		411	0,-
Geir Flåten	Drammen Travbane	08.10.2007	<u>02</u>	2 100	4	04	34,8	04		126	3 000,-
Geir Flåten	Bjerke Travbane	29.08.2007	<u>01</u>	2 180	1	09	STR	-		0	0,-
Magnus Helland	Klosterskogen Travbane	23.08.2007	<u>08</u>	2 100	6	06	34,2	04		201	2 200,-
Geir Vegard Gundersen	Jarlsberg Travbane	17.08.2007	<u>02</u>	2 100	2	02	34,3	03		223	3 500,-
Geir Flåten	Sørlandets Travpark	05.08.2007	<u>01</u>	2 180	2	11	35,4	03		95	2 500,-
Geir Vegard Gundersen	Momarken Travbane	17.07.2007	<u>02</u>	2 140	1	01	34,5	07	G	361	1 500,-
Geir Flåten	Jarlsberg Travbane	06.07.2007	<u>02</u>	2 100	7	07	35,8	00	G	370	0,-
Vidar Hop	Drammen Travbane	25.06.2007	<u>01</u>	2 120	2	09	34,7	04		142	2 200,-
Geir Flåten	Jarlsberg Travbane	01.06.2007	<u>01</u>	2 100	5	05	37,0	02		205	4 000,-
Magnus Helland	Jarlsberg Travbane	18.05.2007	<u>07</u>	2 120	2	07	37,4	08		225	1 000,-
Geir Flåten	Klosterskogen Travbane	10.05.2007	<u>07</u>	2 100	4	04	37,2	00	G	45	0,-
Geir Flåten	Jarlsberg Travbane	27.04.2007	<u>01</u>	2 100	5	05	34,9	05		93	1 000,-
Magnus Helland	Jarlsberg Travbane	30.03.2007	<u>20</u>	2 120	2	11	38,6	-	P		0,-
Per Dave Holtung	Bjerke Travbane	16.11.2005	<u>P</u>	2 160	7	07	51,2	-	B		7 000,-
Per Dave Holtung	Bjerke Travbane	09.11.2005	<u>P</u>	2 180	1	01	51,2	-	G	B	7 000,-

Appendix 9: Horse- and race information for Krylling Viktoria.

The black line indicates time of the treadmill examination.

Krylling Viktoria (Kaldblods trav)

N-05-0666(111) f. 2005 brun hoppe Tot. 25- 2- 2- 1- 9 (6)*28,7K - (9)*28,7aK Kr. 74.326, Trener: Einar Steinseth
Eier: Einar Steinseth, NORESUND Oppdr: Einar Steinseth, NORESUND

Avkom	Karriere	Starter	Status	Stamtavle	Direktelink								
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	I	Tid	Plas.	R	G	Odds	Premie
Herman R. Tvedt	Klosterskogen Travbane	04.09.2014	<u>03</u>	1 700	5	05		STR	-			0	0,-
Geir Flåten	Jarlsberg Travbane	08.08.2014	<u>04</u>	1 600	3	03		31,8	00			42	0,-
Ragnhild Sveen	Biri Travbane	13.06.2014	<u>10</u>	2 100	12	12		dist	00			245	0,-
Bjørn Steinseth	Biri Travbane	06.06.2014	<u>04</u>	1 620	2	04		29,4	02			179	7 500,-
Bjørn Steinseth	Bjerke Travbane	28.05.2014	<u>09</u>	1 640	9	09		29,1	00			111	0,-
Bjørn Steinseth	Momarken Travbane	17.04.2014	<u>03</u>	1 640	2	03		28,7a	01			154	15 000,-
Dag-Sveinung Dalen	Drammen Travbane	28.01.2014	<u>03</u>	2 100	4	04		STR	-			0	0,-
Gunnar Austevoll	Momarken Travbane	21.01.2014	<u>02</u>	2 140	7	07		br	-			153	0,-
Ragnhild Strøm	Biri Travbane	21.07.2013	<u>10</u>	2 100	7	08		33,6a	07			342	2 000,-
Bjørn Steinseth	Bjerke Travbane	23.04.2013	<u>03</u>	1 609	10	10		32,1a	00			637	0,-
Olav Mikkelborg	Jarlsberg Travbane	24.08.2012	<u>03</u>	2 100	3	03		36,4	00			164	0,-
Øyvind Rutenborg	Drammen Travbane	14.08.2012	<u>20</u>	2 120	1	05		34,2	-			P	0,-
Bjørn Steinseth	Biri Travbane	25.05.2012	<u>03</u>	1 609	1	01		dist	00			174	0,-
Bjørn Steinseth	Klosterskogen Travbane	14.11.2011	<u>08</u>	1 700	3	03		STR	-			0	0,-
Bjørn Steinseth	Bjerke Travbane	09.11.2011	<u>07</u>	1 640	3	03		37,3	00			822	0,-
Bjørn Steinseth	Bjerke Travbane	27.10.2011	<u>02</u>	1 609	10	10		31,4a	07			481	2 000,-
Glenn Kramer Stenberg	Jarlsberg Travbane	30.09.2011	<u>03</u>	1 609	12	12		32,0a	00			463	0,-
Øyvind Rutenborg	Biri Travbane	09.08.2011	<u>01</u>	2 100	12	12		dist	00			220	0,-
Cato Antonsen	Bjerke Travbane	27.07.2011	<u>01</u>	1 640	6	06		30,6	04			55	6 000,-
Dagfinn Aarum	Momarken Travbane	19.07.2011	<u>05</u>	1 640	5	05		30,6	06			43	2 000,-
Bjørn Steinseth	Jarlsberg Travbane	05.07.2011	<u>05</u>	1 609	9	09		29,6a	04			40	3 000,-
Cato Antonsen	Årjäng	19.06.2011	<u>01</u>	1 640	3	02		28,7	01			74	17 326,-
Pål Kristiansen	Jarlsberg Travbane	03.06.2011	<u>03</u>	2 100	6	06		37,4	00			320	0,-
Ragnhild Sveen	Biri Travbane	20.05.2011	<u>24</u>	2 120	2	02		35,4	-			P	0,-
Bjørn Steinseth	Bjerke Travbane	12.08.2010	<u>02</u>	1 609	5	05		32,2a	05			117	2 500,-
Ragnhild Strøm	Biri Travbane	25.07.2010	<u>02</u>	1 600	10	10		33,8	06			436	2 000,-
Bjørn Steinseth	Momarken Travbane	13.07.2010	<u>05</u>	2 140	2	02		34,6	06			369	2 000,-
Bjørn Steinseth	Drammen Travbane	07.12.2009	<u>02</u>	1 700	6	06		37,2	05			115	3 000,-
Bjørn Steinseth	Biri Travbane	06.11.2009	<u>10</u>	2 100	4	04		38,1	03			20	4 000,-
Bjørn Steinseth	Momarken Travbane	01.11.2009	<u>01</u>	2 140	3	03		35,4	02			23	6 000,-
Bjørn Steinseth	Drammen Travbane	19.10.2009	<u>21</u>	2 120	2	03		35,4	-			P	0,-

Appendix 10: Horse- and race information for A Gifted Dancer.

The black line indicates time of the treadmill examination.

A Gifted Dancer (Varmblods travler)

578001020105308 f. 2010 brun hoppe Tot. 22- 1- 4- 3- 6 (3)*17,5M - (5)15,1aK Kr. 109.500
Eier: Finn Pedersen, MYSEN Oppdr: Britt Westby, SKIPTVET

Avkom	Karriere	Starter	Status	Stamtavle	Direktelink								
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Åsbjørn Tengsareid	Klostorskogen Travbane	12.11.2015	<u>05</u>	2 100	8	08		STR	-			0	0,-
Kai Johansen	Leangen Travbane	08.08.2015	<u>06</u>	2 140	8	08		STR	-				0,-
Thor Borg	Biri Travbane	19.07.2015	<u>04</u>	2 600	3	03		18,9a	05			68	2 500,-
Kai Johansen	Jarlsberg Travbane	04.07.2015	<u>05</u>	1 609	10	10		15,1a	02	G		108	7 500,-
Thor Borg	Leangen Travbane	27.06.2015	<u>05</u>	2 140	3	03		16,0a	06	G		163	3 000,-
Kai Johansen	Jarlsberg Travbane	18.06.2015	<u>03</u>	1 609	9	09		15,2a	03			116	3 500,-
Kai Johansen	Biri Travbane	05.06.2015	<u>07</u>	1 609	4	04		15,8a	02			248	7 000,-
Joakim Rasmussen	Drammen Travbane	30.05.2015	<u>09</u>	2 100	6	06		18,0a	05			125	2 500,-
Thor Borg	Bjerke Travbane	21.05.2015	<u>02</u>	1 609	8	08		15,7a	05			185	2 000,-
Thor Borg	Drammen Travbane	12.05.2015	<u>01</u>	1 700	5	06		17,5a	06	G		122	2 000,-
Thor Borg	Jarlsberg Travbane	17.04.2015	<u>06</u>	2 100	7	07		18,0	00			158	0,-
Kai Johansen	Bjerke Travbane	18.12.2014	<u>04</u>	2 100	3	03		18,4a	00			149	0,-
Thor Borg	Bjerke Travbane	10.12.2014	<u>05</u>	2 100	1	01		18,7a	00			370	0,-
Jørn Morten Kvikstad	Biri Travbane	28.11.2014	<u>01</u>	2 600	7	07		18,0a	00			135	0,-
Eirik Høitomt	Biri Travbane	06.06.2014	<u>02</u>	1 609	2	02		17,6a	00			46	0,-
Kai Johansen	Biri Travbane	31.10.2013	<u>02</u>	2 100	4	08		16,6a	02			45	7 500,-
Kai Johansen	Momarken Travbane	12.10.2013	<u>09</u>	2 140	7	07		brg	-	G		266	0,-
Kai Johansen	Momarken Travbane	01.10.2013	<u>06</u>	2 140	7	07		17,4a	03			93	9 000,-
Kai Johansen	Bjerke Travbane	18.09.2013	<u>03</u>	2 100	4	04		16,6a	00			78	0,-
Kai Johansen	Bjerke Travbane	08.09.2013	<u>03</u>	2 100	12	12		16,6a	12			206	3 000,-
Kai Johansen	Bjerke Travbane	27.08.2013	<u>05</u>	2 100	6	06		16,3a	02			35	15 000,-
Kai Johansen	Bjerke Travbane	07.08.2013	<u>05</u>	2 140	4	04		17,5	01			40	40 000,-
Kai Johansen	Biri Travbane	26.07.2013	<u>04</u>	2 100	3	03		18,5a	00	G		70	0,-
Kai Johansen	Jarlsberg Travbane	10.07.2013	<u>01</u>	2 100	1	01		18,1	03			42	5 000,-
Tor Wollebæk	Biri Travbane	14.06.2013	<u>23</u>	2 100	2	02		21,2	-			P	0,-
Kai Johansen	Bjerke Travbane	21.11.2012	<u>20</u>	1 640	2	02		25,1	-			B	0,-
Stian Eilefsen	Momarken Travbane	13.11.2012	<u>22</u>	2 140	3	03		32,5	-	G		N	0,-
Stian Eilefsen	Bjerke Travbane	12.09.2012	<u>27</u>	1 660	4	08		STR	-				0,-
Stian Eilefsen	Bjerke Travbane	05.09.2012	<u>20</u>	1 660	2	07		27,2	-	G		B	0,-

Appendix 11: Horse- and race information for Mollyn.

The black line indicates time of the treadmill examination.

Mollyn (Kaldblods travser)

578001020120165(117) f. 2012 Død brun hingst Tot. 46- 4- 3- 2- 20 (4)27,1M - (6)28,0aM Kr. 196.500
Eier: Lars O. Romtveit, SKOPPUM Oppdr: Sverre Hjørnerød, FREDRIKSTAD

Avkom	Karriere	Starter	Status	Stamtavle	Utstilling	Direktelink							
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Inga Lamvik	Jarlsberg Travbane	02.06.2019	<u>03</u>	2 140	1	10	M	dg	-			61	0,-
Josefine Eilertsen	Bjerke Travbane	30.01.2019	<u>03</u>	1 609	2	02		STR	-			0	0,-
Josefine Eilertsen	Bjerke Travbane	26.12.2018	<u>01</u>	2 140	1	01	M	35,1	00			108	0,-
Josefine Eilertsen	Bjerke Travbane	13.11.2018	<u>03</u>	1 609	1	01		28,8a	03			55	5 000,-
Josefine Eilertsen	Bjerke Travbane	20.08.2018	<u>03</u>	2 100	6	06		28,7a	05			130	3 000,-
Josefine Eilertsen	Jarlsberg Travbane	05.08.2018	<u>03</u>	2 120	2	09	M	28,7	04			67	4 000,-
Josefine Eilertsen	Klosterskogen Travbane	26.07.2018	<u>07</u>	2 100	5	05	M	29,1	01			55	16 000,-
Josefine Eilertsen	Momarken Travbane	19.06.2018	<u>08</u>	2 160	1	04	M	30,5	04			57	4 000,-
Josefine Eilertsen	Jarlsberg Travbane	11.06.2018	<u>04</u>	2 100	4	04		28,0a	04			268	5 000,-
Herman R. Tvedt	Jarlsberg Travbane	01.06.2018	<u>06</u>	2 100	1	01		dg	-			181	0,-
Josefine Eilertsen	Drammen Travbane	28.04.2018	<u>03</u>	2 100	8	08		29,5a	01			395	14 000,-
Josefine Eilertsen	Jarlsberg Travbane	25.03.2018	<u>03</u>	2 100	5	05	M	35,2	00	G		63	0,-
Herman R. Tvedt	Klosterskogen Travbane	08.03.2018	<u>05</u>	1 700	3	03		dg	-			211	0,-
Herman R. Tvedt	Bjerke Travbane	01.03.2018	<u>05</u>	1 609	1	01		28,8a	02			269	7 000,-
Josefine Eilertsen	Klosterskogen Travbane	27.11.2017	<u>03</u>	2 100	3	03	M	34,1	00			158	0,-
Josefine Eilertsen	Drammen Travbane	09.11.2017	<u>01</u>	2 100	2	02		31,3a	00			289	0,-
Josefine Eilertsen	Drammen Travbane	17.10.2017	<u>05</u>	1 700	1	01		dg	-			382	0,-
Josefine Eilertsen	Bjerke Travbane	04.10.2017	<u>03</u>	2 140	1	01	M	32,6	00			162	0,-
Per Oleg Midtfield	Jarlsberg Travbane	30.09.2017	<u>08</u>	2 120	7	13		28,1	00	G		665	0,-
Josefine Eilertsen	Klosterskogen Travbane	16.09.2017	<u>03</u>	2 100	2	02	M	30,9	06			49	3 000,-
Josefine Eilertsen	Bjerke Travbane	06.09.2017	<u>03</u>	2 140	3	03	M	31,4	01			25	24 000,-
Josefine Eilertsen	Jarlsberg Travbane	27.08.2017	<u>21</u>	2 120	1	04	M	29,8	-			P	0,-
Josefine Eilertsen	Jarlsberg Travbane	04.08.2017	<u>20</u>	2 120	1	10		32,4	-			P	0,-
Adrian Solberg Akselsen	Jarlsberg Travbane	21.10.2016	<u>21</u>	2 120	1	07		STR	-			-	0,-
Adrian Solberg Akselsen	Klosterskogen Travbane	25.08.2016	<u>02</u>	2 100	5	05		br	-			201	0,-
Adrian Solberg Akselsen	Klosterskogen Travbane	18.08.2016	<u>05</u>	2 520	3	05		32,7	00			385	0,-
Adrian Solberg Akselsen	Jarlsberg Travbane	05.08.2016	<u>08</u>	2 640	3	07		29,7	05			269	3 000,-
Per Oleg Midtfield	Sørlandets Travpark	23.07.2016	<u>06</u>	2 160	5	11		27,1	07	G		804	4 000,-
Per Oleg Midtfield	Bjerke Travbane	13.07.2016	<u>01</u>	2 600	1	01		31,7a	04			294	6 000,-
Per Oleg Midtfield	Bjerke Travbane	29.06.2016	<u>02</u>	2 640	2	02		31,7	00			433	0,-
Tom Erik Solberg	Jarlsberg Travbane	08.05.2016	<u>04</u>	2 100	2	02		STR	-			0	0,-
Tom Erik Solberg	Klosterskogen Travbane	28.04.2016	<u>05</u>	2 120	7	14		30,4	04			94	4 000,-
Tom Erik Solberg	Bjerke Travbane	09.03.2016	<u>03</u>	2 160	4	09		33,3	00	G		167	0,-
Tom Erik Solberg	Bjerke Travbane	17.02.2016	<u>02</u>	2 140	7	07		29,8	02			57	12 000,-
Adrian Solberg Akselsen	Bjerke Travbane	23.01.2016	<u>05</u>	2 140	1	01		32,7	00			93	0,-
Tom Erik Solberg	Klosterskogen Travbane	09.01.2016	<u>02</u>	2 120	1	03		31,0	02			51	8 000,-
Tom Erik Solberg	Drammen Travbane	28.11.2015	<u>04</u>	2 100	5	05		35,0	00			186	0,-
Tom Erik Solberg	Bjerke Travbane	04.11.2015	<u>09</u>	2 140	1	01		30,9	01			18	20 000,-
Tom Erik Solberg	Bergen Travpark	10.10.2015	<u>04</u>	2 100	3	03		29,0	05	G		329	8 000,-
Per Oleg Midtfield	Klosterskogen Travbane	26.09.2015	<u>04</u>	2 120	4	06		30,6	05			550	8 000,-
Geir Vegard Gundersen	Bjerke Travbane	16.09.2015	<u>09</u>	2 140	5	05		31,4	06	G		145	2 000,-
Adrian Solberg Akselsen	Jarlsberg Travbane	03.09.2015	<u>06</u>	2 100	2	02		30,0	03			220	4 000,-
Adrian Solberg Akselsen	Jarlsberg Travbane	21.08.2015	<u>01</u>	2 100	3	03		30,3	05			382	3 000,-
Adrian Solberg Akselsen	Klosterskogen Travbane	10.08.2015	<u>09</u>	2 120	2	07		34,1	08	G		40	2 000,-
Per Oleg Midtfield	Sørlandets Travpark	18.07.2015	<u>04</u>	2 160	1	03		31,7	00	G		538	0,-
Per Oleg Midtfield	Jarlsberg Travbane	02.07.2015	<u>05</u>	2 100	4	04		31,0	04	G		437	10 000,-
Per Oleg Midtfield	Momarken Travbane	23.06.2015	<u>01</u>	2 160	4	07		31,2	05	G		199	2 500,-
Adrian Solberg Akselsen	Jarlsberg Travbane	12.06.2015	<u>09</u>	2 100	5	05		32,1	04			70	2 500,-
Per Oleg Midtfield	Momarken Travbane	28.04.2015	<u>09</u>	2 140	2	02		33,0	07	G		1129	4 000,-
Adrian Solberg Akselsen	Jarlsberg Travbane	20.03.2015	<u>07</u>	2 120	2	04		36,5	04	G		217	7 000,-
Adrian Solberg Akselsen	Drammen Travbane	02.03.2015	<u>01</u>	2 100	3	03		38,5	05	G		43	1 500,-
Adrian Solberg Akselsen	Jarlsberg Travbane	25.09.2014	<u>20</u>	2 120	3	08		40,2	-	G		P	0,-
Silje Kristin Eilertsen	Jarlsberg Travbane	24.06.2014	<u>22</u>	2 120	1	11		47,8	-			B	0,-
Eirik Høitomt	Jarlsberg Travbane	16.05.2014	<u>21</u>	2 140	2	14		54,8	-			B	0,-

Appendix 12: Horse- and race information for Lykkje Rappen.

The black line indicates time of the treadmill examination.

Lykkje Rappen (Kaldblods travser)

578001020110343(116) f. 2011 brun vallak Tot. 30- 2- 1- 4- 6 (5)30,0M - (5)32,4aM Kr. 66.500
Eier: Marte Bratt Jensen, GRESSVIK Oppdr: Svenhaug AS, BRUMUNDDAL

Karriere	Starter	Status	Stamtavle					Direktelink					
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Irmelin Risa	Sørlandets Travpark	09.04.2017	<u>21</u>	2 160	4	05		35,9	-	R	G	N	0,-
Siv Emilie Løvvold	Jarlsberg Travbane	03.09.2016	<u>21</u>	2 100	2	02	M	dgpp	-			N	0,-
Thor Borg	Jarlsberg Travbane	23.08.2016	<u>02</u>	2 100	6	06		brg	-		G	326	0,-
Thor Borg	Jarlsberg Travbane	12.08.2016	<u>03</u>	1 609	12	12		g11	-		G	703	0,-
Thor Borg	Momarken Travbane	06.08.2016	<u>02</u>	2 140	8	08		brg	-		G	422	0,-
Gunnar Austevoll	Klosterskogen Travbane	28.07.2016	<u>05</u>	2 100	4	04		32,3	00		G	184	0,-
Vidar Hop	Momarken Travbane	12.07.2016	<u>04</u>	2 140	3	03		dg	-			112	0,-
Thor Borg	Jarlsberg Travbane	08.07.2016	<u>09</u>	2 100	3	03		30,0	06			335	3 000,-
Gunnar Austevoll	Jarlsberg Travbane	27.06.2016	<u>01</u>	2 100	3	03		dg	-			264	0,-
Gunnar Austevoll	Momarken Travbane	08.03.2016	<u>02</u>	2 140	3	03		34,2a	00			181	0,-
Gunnar Austevoll	Momarken Travbane	16.02.2016	<u>02</u>	1 640	11	11		dg	-			102	0,-
Gunnar Austevoll	Jarlsberg Travbane	05.02.2016	<u>02</u>	2 100	9	09		32,4a	00		G	154	0,-
Gunnar Austevoll	Bjerke Travbane	21.01.2016	<u>03</u>	2 100	4	05		34,8a	00		G	20	0,-
Gunnar Austevoll	Momarken Travbane	08.12.2015	<u>03</u>	2 140	2	02		31,8	03			60	7 000,-
Gunnar Austevoll	Bjerke Travbane	24.11.2015	<u>04</u>	2 100	6	06		33,6a	01			49	12 000,-
Gunnar Austevoll	Bjerke Travbane	04.11.2015	<u>09</u>	2 140	3	03		31,3	05			62	3 000,-
Gunnar Austevoll	Bjerke Travbane	28.10.2015	<u>09</u>	2 140	2	02		30,0	04			392	5 000,-
Gunnar Austevoll	Jarlsberg Travbane	03.10.2015	<u>04</u>	2 100	7	07		30,8	06			270	2 000,-
Vidar Hop	Klosterskogen Travbane	20.08.2015	<u>09</u>	2 120	8	12		dg	-			439	0,-
Vidar Hop	Bjerke Travbane	12.08.2015	<u>09</u>	2 160	7	15		31,2	00			195	0,-
Vidar Hop	Biri Travbane	24.07.2015	<u>09</u>	2 100	5	05		32,7	00		G	63	0,-
Eirik Høitomt	Momarken Travbane	07.07.2015	<u>04</u>	2 140	12	12		33,3	02			141	7 000,-
Gunnar Austevoll	Jarlsberg Travbane	03.07.2015	<u>06</u>	2 100	2	02		dg	-		G	840	0,-
Vidar Hop	Jarlsberg Travbane	12.06.2015	<u>08</u>	2 120	6	13		dg	-			695	0,-
Vidar Hop	Drammen Travbane	30.05.2015	<u>03</u>	2 100	2	02		34,0	03		G	51	4 000,-
Eirik Høitomt	Momarken Travbane	19.05.2015	<u>08</u>	2 140	2	02		35,8	07		G	61	2 000,-
Eirik Høitomt	Klosterskogen Travbane	19.03.2015	<u>06</u>	2 100	8	08		dg	-			37	0,-
Eirik Høitomt	Drammen Travbane	02.03.2015	<u>03</u>	2 100	3	03		34,8	03		G	34	4 000,-
Eirik Høitomt	Biri Travbane	13.02.2015	<u>03</u>	2 100	4	04		36,0	01			21	12 000,-
Eirik Høitomt	Bjerke Travbane	25.06.2014	<u>09</u>	2 140	4	04		36,4	07			65	2 000,-
Eirik Høitomt	Biri Travbane	13.06.2014	<u>01</u>	2 100	6	06		35,4	03			103	3 500,-
Vidar Hop	Jarlsberg Travbane	16.05.2014	<u>01</u>	2 100	4	04		brg	-		G	66	0,-
Vidar Hop	Jarlsberg Travbane	28.03.2014	<u>20</u>	2 120	5	12		36,8	-			P	0,-
Geir Kihle	Jarlsberg Travbane	18.10.2013	<u>22</u>	2 120	1	08		53,4	-		G	B	0,-
Geir Kihle	Jarlsberg Travbane	09.08.2013	<u>21</u>	2 120	4	11		58,2	-			B	0,-

Appendix 13: Horse- and race information for Norheim Jerv.

The black line indicates time of the treadmill examination.

Norheim Jærv (Kaldblods trav)

578001020080233(123) f. 2008 Død mørkbr hingst Tot. 109- 21- 21- 14- 24 (7)22,4M - (8)20,8aK Kr. 2.029.988
Eier: Georg W. Sverdrup & Bodil Sælid, VINTERBRO Oppdr: Egil Skeivoll, NODELAND

Avkom	Karriere	Starter	Status	Stamtavle	Utstilling	Direktelink							
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Stian Eilefsen	Klosterskogen Travbane	29.08.2019	02	1 300	7	07		STR	-			0	0,-
Stian Eilefsen	Biri Travbane	09.08.2019	07	2 640	1	04		26,3	04	G		86	4 000,-
Stian Eilefsen	Kala Travpark	03.08.2019	06	1 940	1	12		25,5	04			234	4 500,-
Per Oleg Midtfield	Bjerke Travbane	15.05.2019	05	2 100	2	02		26,9a	00	G		143	0,-
Kristian Malmin	Forus Travbane	04.05.2019	08	1 620	3	08		23,2	00			391	0,-
Per Oleg Midtfield	Momarken Travbane	22.04.2019	04	1 640	8	08		22,5a	04			67	5 000,-
Per Oleg Midtfield	Klosterskogen Travbane	08.04.2019	06	1 700	6	06		STR	-			0	0,-
Per Oleg Midtfield	Sørlandets Travpark	09.03.2019	06	1 609	3	03		STR	-			0	0,-
Per Oleg Midtfield	Bjerke Travbane	23.02.2019	06	2 680	2	09		25,4	07			573	10 000,-
Per Oleg Midtfield	Klosterskogen Travbane	18.02.2019	06	1 700	7	07		27,6a	02			74	9 000,-
Stian Eilefsen	Bjerke Travbane	30.01.2019	20	2 160	1	02		28,4	-			P	0,-
Hans Chr. Holm	Bjerke Travbane	17.01.2018	03	2 140	3	03		27,6	00			223	0,-
Hans Chr. Holm	Bjerke Travbane	20.12.2017	07	1 609	1	01		24,8a	00			692	0,-
Kai Johansen	Bjerke Travbane	25.02.2017	09	2 680	2	06		27,2	00			1130	0,-
Magnus Teien Gundersen	Bjerke Travbane	18.01.2017	07	2 100	2	02		26,0a	00			343	0,-
Kai Johansen	Momarken Travbane	27.12.2016	06	1 660	4	08		24,9	00			569	0,-
Kai Johansen	Jarlsberg Travbane	26.11.2016	06	2 100	1	01		24,2a	03			366	20 000,-
Kai Johansen	Bjerke Travbane	16.11.2016	08	1 609	3	03		23,8a	00			402	0,-
Kai Johansen	Biri Travbane	05.11.2016	05	2 620	3	08		26,5	00			550	0,-
Kai Johansen	Biri Travbane	29.07.2016	02	2 100	9	09		24,2a	00			142	0,-
Kai Johansen	Jarlsberg Travbane	09.07.2016	06	1 609	4	04		21,0a	04			212	12 000,-
Kai Johansen	Bjerke Travbane	12.06.2016	08	1 609	7	07		20,8a	00			1537	0,-
Kai Johansen	Drammen Travbane	29.05.2016	07	2 140	1	09		24,5	02			68	8 000,-
Kai Johansen	Bjerke Travbane	18.05.2016	05	2 100	3	03		23,1a	06			44	4 000,-
Kai Johansen	Momarken Travbane	10.05.2016	02	2 140	4	04		23,6a	01			72	18 000,-
Kai Johansen	Bjerke Travbane	20.04.2016	07	2 100	3	03		25,6a	00			161	0,-
Kai Johansen	Momarken Travbane	19.03.2016	07	2 180	3	11		25,1	00			254	0,-
Kai Johansen	Bjerke Travbane	20.02.2016	09	2 140	10	10		26,2	00	G		349	0,-
Tom Erik Solberg	Bjerke Travbane	03.02.2016	03	2 100	3	03		25,8a	03			108	12 000,-
Thor Borg	Bjerke Travbane	23.01.2016	07	2 680	8	12		28,8	00			112	0,-
Kai Johansen	Momarken Travbane	28.12.2015	06	1 640	4	04		22,4a	01			84	80 000,-
Kai Johansen	Bjerke Travbane	16.12.2015	07	1 609	6	07		21,9a	02			18	20 000,-
Kai Johansen	Drammen Travbane	28.11.2015	09	1 700	7	07		24,8a	02			73	40 000,-
Kai Johansen	Biri Travbane	14.11.2015	10	2 620	12	14		24,8	01			121	150 000,-
Kai Johansen	Jarlsberg Travbane	07.11.2015	06	1 609	11	12		21,9a	01			229	80 000,-
Erik Adielsson	Bergsåker	31.10.2015	06	2 180	5	14		22,4	02			110	73 140,-
Erik Adielsson	Bollnäs	16.10.2015	09	2 140	4	04		22,9a	02			434	15 896,-
Erik Adielsson	Solvalla	31.05.2015	10	1 609	11	10		22,0a	00			1537	0,-
Erik Adielsson	Umeå	09.05.2015	03	1 640	5	03		22,4a	02			122	48 760,-
Göte Windelås	Boden	24.04.2015	08	2 180	13	01		25,8	04			23	3 755,-
Kai Johansen	Momarken Travbane	21.03.2015	09	2 160	4	11		24,0	03	G		250	30 000,-
Tom Erik Solberg	Jarlsberg Travbane	13.03.2015	06	1 609	4	04		21,9a	01			31	18 000,-
Tom Erik Solberg	Bjerke Travbane	28.02.2015	06	2 140	1	01		26,4	00			327	0,-
Tom Erik Solberg	Jarlsberg Travbane	14.02.2015	09	2 100	10	10		28,0	01			262	70 000,-
Tom Erik Solberg	Bjerke Travbane	31.01.2015	06	2 660	4	05		28,1	05			156	8 000,-
Tom Erik Solberg	Forus Travbane	10.01.2015	09	2 040	6	06		26,6	02			111	35 000,-
Tom Erik Solberg	Bjerke Travbane	20.12.2014	09	2 160	1	05		25,3	03			152	25 000,-
Tom Erik Solberg	Drammen Travbane	06.12.2014	06	1 700	7	07		24,1a	03			350	20 000,-
Kai Johansen	Leangen Travbane	29.11.2014	09	2 140	1	01		23,7a	02			57	30 000,-
Tom Erik Solberg	Biri Travbane	08.11.2014	09	2 620	7	12		28,5	00			270	0,-
Tom Erik Solberg	Bergen Travpark	11.10.2014	10	1 600	12	12		STR	-			0	0,-
Tom Erik Solberg	Bjerke Travbane	24.09.2014	03	1 609	1	02		22,2a	04			66	8 000,-
Kai Johansen	Bjerke Travbane	07.09.2014	02	2 140	7	07		23,2	03			175	25 000,-
Tom Erik Solberg	Bjerke Travbane	27.08.2014	01	1 609	3	03		21,0a	03			407	9 000,-
Lars Anvar Kolle	Klosterskogen Travbane	09.08.2014	09	2 120	8	14		24,7	04			131	12 000,-
Lars Anvar Kolle	Biri Travbane	03.08.2014	02	1 609	3	03		23,9a	00			104	0,-
Lars Anvar Kolle	Sørlandets Travpark	19.07.2014	09	2 609	10	10		24,0a	00			551	0,-
Stian Eilefsen	Hagmyren	01.07.2014	06	1 640	12	03		21,7a	05			928	5 606,-
Tom Erik Solberg	Leangen Travbane	22.06.2014	08	1 640	1	01		24,8a	02			502	52 500,-
Andre H. Stensen	Orkdal Tråvpark	20.06.2014	07	2 100	10	10		25,6	06			613	5 000,-
Tom Erik Solberg	Bjerke Travbane	05.04.2014	10	2 160	10	13		27,0	00			57	0,-
Tom Erik Solberg	Momarken Travbane	22.03.2014	08	2 140	6	06		25,3	07	G		165	7 000,-
Tom Erik Solberg	Hippodrome de Vincennes	23.02.2014	07	2 100	5	02		25,0a	05			90	8 435,-
Tom Erik Solberg	Hippodrome de Vincennes	20.02.2014	07	2 100	1	01		25,3a	03			35	23 617,-
Tom Erik Solberg	Bjerke Travbane	25.01.2014	09	2 680	5	07		27,5	06			89	5 000,-
Tom Erik Solberg	Jarlsberg Travbane	18.01.2014	09	2 100	10	11		24,7a	01			42	60 000,-
Geir Vegard Gundersen	Bjerke Travbane	21.12.2013	10	2 160	2	06		26,5	03			58	25 000,-
Tom Erik Solberg	Bjerke Travbane	11.12.2013	09	2 160	7	10		26,1	01			45	50 000,-
Tom Erik Solberg	Leangen Travbane	30.11.2013	10	2 160	1	05		26,8	01			32	60 000,-
Tom Erik Solberg	Klosterskogen Travbane	23.11.2013	09	2 100	8	08		27,0	01			151	60 000,-

Tom Erik Solberg	Biri Travbane	09.11.2013	<u>06</u>	2 140	7	13	27,4	02	155	30 000,-
Stian Eilefsen	Momarken Travbane	12.10.2013	<u>10</u>	2 660	3	07	27,7	00	493	0,-
Stian Eilefsen	Leangen Travbane	05.10.2013	<u>10</u>	2 160	5	15	27,4	00	208	0,-
Tom Erik Solberg	Bjerke Travbane	25.09.2013	<u>09</u>	2 160	9	14	25,6	00	224	0,-
Kai Johansen	Bjerke Travbane	07.09.2013	<u>04</u>	2 180	6	11	24,7	06	99	10 000,-
Tom Erik Solberg	Klosterskogen Travbane	31.08.2013	<u>10</u>	2 120	10	12	26,3	02	79	30 000,-
Bo Ekløf	Östersund	02.08.2013	<u>04</u>	2 200	12	03	25,5	00	G 72	0,-
Tom Erik Solberg	Momarken Travbane	23.07.2013	<u>02</u>	1 640	4	05	23,0a	02	17	9 000,-
Tom Erik Solberg	Jarlsberg Travbane	13.07.2013	<u>10</u>	2 100	6	06	25,2	03	G 98	20 000,-
Bo Ekløf	Bollnäs	02.07.2013	<u>06</u>	2 200	13	03	26,2	00	G 292	0,-
Tom Erik Solberg	Leangen Travbane	16.06.2013	<u>04</u>	2 220	1	07	24,5	03	59	25 000,-
Tom Erik Solberg	Biri Travbane	01.06.2013	<u>10</u>	1 620	8	14	24,0	05	235	8 000,-
Tom Erik Solberg	Jarlsberg Travbane	18.05.2013	<u>09</u>	2 120	1	06	24,7	02	55	30 000,-
Tom Erik Solberg	Jarlsberg Travbane	10.05.2013	<u>07</u>	2 100	12	12	26,7a	02	43	9 000,-
Tom Erik Solberg	Biri Travbane	27.04.2013	<u>10</u>	2 120	1	04	24,9	06	34	5 000,-
Kai Johansen	Bjerke Travbane	23.03.2013	<u>09</u>	2 160	2	05	26,3	01	35	150 000,-
Kai Johansen	Sørlandets Travpark	09.03.2013	<u>09</u>	2 160	2	08	26,9	01	23	60 000,-
Kai Johansen	Bjerke Travbane	22.02.2013	<u>03</u>	2 180	2	07	28,3	01	14	20 000,-
Kai Johansen	Bjerke Travbane	06.02.2013	<u>06</u>	1 609	8	08	25,5a	01	26	30 000,-
Tom Erik Solberg	Bjerke Travbane	30.01.2013	<u>08</u>	2 600	2	02	33,6a	01	15	30 000,-
Tom Erik Solberg	Bjerke Travbane	19.01.2013	<u>07</u>	2 160	5	11	dv1	-	31	0,-
Tom Erik Solberg	Bjerke Travbane	22.12.2012	<u>03</u>	2 100	7	07	28,0a	02	16	10 000,-
Tom Erik Solberg	Bjerke Travbane	05.12.2012	<u>10</u>	2 100	2	02	30,6a	01	28	30 000,-
Tom Erik Solberg	Bjerke Travbane	09.09.2012	<u>05</u>	2 600	6	06	27,1a	10	G 994	5 000,-
Tom Erik Solberg	Bjerke Travbane	27.08.2012	<u>13</u>	2 600	6	06	27,7a	03	213	9 000,-
Bo Ekløf	Östersund	05.08.2012	<u>08</u>	2 140	5	02	25,5a	04	G 364	72 358,-
Bo Ekløf	Östersund	26.07.2012	<u>07</u>	2 140	4	01	27,2a	02	62	12 921,-
Tom Erik Solberg	Bjerke Travbane	04.07.2012	<u>03</u>	2 600	7	07	28,2a	02	41	15 000,-
Tom Erik Solberg	Leangen Travbane	16.06.2012	<u>06</u>	2 640	2	02	28,4	03	64	25 000,-
Anette Frønes	Klosterskogen Travbane	31.05.2012	<u>08</u>	1 700	10	10	29,4a	02	22	8 000,-
Tom Erik Solberg	Bjerke Travbane	24.05.2012	<u>04</u>	1 609	2	02	26,6a	02	G 16	6 000,-
Tom Erik Solberg	Bjerke Travbane	10.05.2012	<u>02</u>	2 100	5	06	28,0a	01	13	12 000,-
Tom Erik Solberg	Biri Travbane	20.04.2012	<u>03</u>	2 100	1	01	29,2a	01	26	14 000,-
Kai Johansen	Klosterskogen Travbane	07.04.2012	<u>07</u>	2 100	2	02	31,2	00	G 140	0,-
Tom Erik Solberg	Biri Travbane	23.03.2012	<u>06</u>	2 100	11	12	28,6a	01	13	16 000,-
Tom Erik Solberg	Bjerke Travbane	07.03.2012	<u>02</u>	2 140	2	02	30,7	02	G 51	15 000,-
Tom Erik Solberg	Drammen Travbane	28.02.2012	<u>04</u>	2 100	11	12	32,9a	03	40	4 000,-
Geir Vegard Gundersen	Sørlandets Travpark	08.10.2011	<u>07</u>	2 160	3	07	STR	-	0	0,-
Geir Vegard Gundersen	Biri Travbane	30.09.2011	<u>01</u>	2 120	2	04	30,1	01	17	12 000,-
Geir Vegard Gundersen	Bjerke Travbane	18.09.2011	<u>05</u>	2 100	12	12	30,0a	08	1095	5 000,-
Geir Vegard Gundersen	Bjerke Travbane	06.09.2011	<u>03</u>	2 100	7	07	32,1a	04	351	6 000,-
Tom Erik Solberg	Bjerke Travbane	17.08.2011	<u>07</u>	2 140	7	07	31,8	05	G 27	2 500,-
Geir Vegard Gundersen	Momarken Travbane	05.08.2011	<u>02</u>	2 160	1	06	33,9	01	94	12 000,-
Lars Anvar Kolle	Sørlandets Travpark	22.07.2011	<u>01</u>	2 140	8	08	34,3	00	G 130	0,-
Geir Vegard Gundersen	Bjerke Travbane	29.06.2011	<u>07</u>	2 140	2	02	34,0	06	G 47	2 000,-
Geir Vegard Gundersen	Biri Travbane	29.04.2011	<u>10</u>	2 120	6	13	44,9	-	G P	0,-
Tom Erik Solberg	Bjerke Travbane	29.12.2010	<u>25</u>	1 640	4	04	54,5	-	B	0,-

Appendix 14: Horse- and race information for L'auren.

L'auren (Varmblods trav)

578001020145410 f. 2014 Død brun hoppe Tot. 6- 0- 0- 0- 1 (3)21,4M - (4)21,2aM Kr. 3.000

Eier: Håkon J. Bue & Gerhard W. Bue, MAURA Oppdr: Marianne Landsem & John Ragnar Vanvik, HOVIN I GAULDAL

Karriere	Starter	Status	Stamtavle		Direktelink								
Kusknavn	Banenavn	Dato	Løp	Dist.	Spor	Prog.nr	T	Tid	Plas.	R	G	Odds	Premie
Hans Wilhelm Storås	Bjerke Travbane	01.02.2018	<u>07</u>	2 100	2	03		21,2a	00			453	0,-
Hans Wilhelm Storås	Biri Travbane	26.01.2018	<u>07</u>	2 100	6	06		23,3a	00	G		106	0,-
Hans Wilhelm Storås	Bjerke Travbane	03.01.2018	<u>02</u>	2 140	4	04		27,4	08	G		61	3 000,-
Tor Arne Eggen	Leangen Travbane	04.09.2017	<u>01</u>	2 140	6	06		25,6	00	G		321	0,-
Tor Arne Eggen	Leangen Travbane	22.05.2017	<u>07</u>	2 140	1	01		24,9	00			288	0,-
Tor Arne Eggen	Leangen Travbane	15.05.2017	<u>01</u>	2 140	9	09		21,4	00			553	0,-
Tor Arne Eggen	Leangen Travbane	24.04.2017	<u>11</u>	2 140	5	05		21,8	-			P	0,-
Tor Arne Eggen	Leangen Travbane	17.04.2017	<u>20</u>	2 140	6	06		dgpp	-	G		N	0,-
Tor Arne Eggen	Leangen Travbane	20.02.2017	<u>20</u>	2 140	3	03		27,0	-			N	0,-
Tor Arne Eggen	Leangen Travbane	12.09.2016	<u>20</u>	1 640	2	02		28,4	-			B	0,-
Tor Arne Eggen	Leangen Travbane	06.09.2016	<u>20</u>	1 640	2	02		25,2	-			B	0,-

Appendix 15: Horse- and race information for Time for Money.

The black line indicates time of the treadmill examination.

Time for Money (SE) (Varmblods travet)

75200211S151964 f. 2015 brun vallak Tot. 22- 2- 6- 2- 8 (2)17,0K - (4)14,6aM Kr. 264.186, Trener: Diana L. Olsson
Eier: Diana L. Olsson, ASKIM Psevd: Stall Time For Money Oppdr: Sverige,

Karriere	Starter	Status	Stamtavle				Direktelink					
Kusknavn	Bannavn	Dato	Løp	Dist.	Spor	Prog.nr I	Tid	Plas.	R	G	Odds	Premie
<u>Ole Johan Østre</u>	Drammen Travbane	05.12.2019	<u>04</u>	2 120	3	04	STR	-			0	0,-
Jan Silven	Färjestad	07.10.2019	06	2 140	15	15	16,1a	00			464	474,-
Tom Horpestad	Arvika	18.07.2019	06	1 700	8	08	STR	-				0,-
<u>Ole Johan Østre</u>	Axevalla	20.06.2019	01	1 640	4	04	STR	-				0,-
<u>Ole Johan Østre</u>	Färjestad	10.06.2019	07	2 140	4	04	brg	-	G		289	474,-
<u>Erlend Rennesvik</u>	Bjerke Travbane	29.05.2019	<u>07</u>	2 100	7	08	16,5a	00	G		264	0,-
<u>Ole Johan Østre</u>	Bergsåker	01.05.2019	06	2 140	10	10	14,6a	07			830	3 317,-
Erik Adielsson	Solvalla	05.03.2019	03	2 140	1	01	18,4a	04	G		89	12 793,-
<u>Erlend Rennesvik</u>	Jarlsberg Travbane	16.02.2019	<u>03</u>	3 120	2	06	18,4	02			116	25 000,-
<u>Ole Johan Østre</u>	Klosteskogen Travbane	28.01.2019	<u>06</u>	1 700	10	10	16,4a	06	G		26	3 000,-
<u>Ole Johan Østre</u>	Färjestad	14.01.2019	04	2 140	11	11	15,9a	01			41	23 690,-
<u>Ole Johan Østre</u>	Bjerke Travbane	02.01.2019	<u>07</u>	2 100	6	06	15,9a	05			100	5 000,-
<u>Ole Johan Østre</u>	Sørlandets Travpark	16.12.2018	<u>01</u>	2 140	5	05	STR	-			0	0,-
<u>Ole Johan Østre</u>	Momarken Travbane	04.12.2018	<u>01</u>	2 640	5	05	19,3a	01			40	18 000,-
Torbjørn Jansson	Romme	14.09.2018	04	2 140	1	01	STR	-				0,-
<u>Ole Johan Østre</u>	Färjestad	10.09.2018	08	2 160	2	10	19,7	08			64	5 403,-
<u>Ole Johan Østre</u>	Leangen Travbane	26.08.2018	<u>02</u>	1 640	2	02	15,4a	03			17	5 000,-
<u>Ole Johan Østre</u>	Biri Travbane	10.08.2018	<u>06</u>	2 100	1	01	STR	-			0	0,-
<u>Ole Johan Østre</u>	Åmål	27.06.2018	10	2 080	1	01	STR	-				0,-
Torbjørn Jansson	Lindesberg	15.06.2018	03	2 140	6	06	16,3a	02			66	24 560,-
<u>Ole Johan Østre</u>	Romme	18.05.2018	05	2 140	1	01	14,7a	02			203	24 560,-
Michael Lønborg	Aby	09.05.2018	05	2 140	5	05	15,6a	06	G		173	6 386,-
<u>Ole Johan Østre</u>	Jarlsberg Travbane	22.04.2018	<u>01</u>	1 609	6	06	brg	-	G		13	0,-
<u>Ole Johan Østre</u>	Örebro	12.04.2018	05	2 100	3	03	14,9a	06			186	5 894,-
<u>Ole Johan Østre</u>	Mantorp	13.03.2018	04	2 140	10		17,1a	04			129	35 366,-
<u>Ole Johan Østre</u>	Bjerke Travbane	07.02.2018	<u>04</u>	2 100	7	07	15,6a	02			19	12 000,-
<u>Ole Johan Østre</u>	Solvalla	16.01.2018	01	2 140	4	04	17,9	02			97	34 384,-
<u>Ole Johan Østre</u>	Färjestad	28.10.2017	02	1 640	1	01	19,7	02			25	11 515,-
<u>Ole Johan Østre</u>	Färjestad	02.10.2017	02	1 640	9	09	17,0	03			85	7 370,-
<u>Ole Johan Østre</u>	Bjerke Travbane	16.08.2017	<u>22</u>	2 140	3	03	19,6	-			P	0,-



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