



Evaluation of the animal welfare work performed by the licensing committees and a proposal on how to establish an enhanced animal welfare assurance program for the Swedish Trotting Association

Utvärdering av licenskommittéernas djurskyddsarbete och förslag till förbättrat djurskyddskontrollprogram för Svensk Travsport

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Photo Anders Rönnholm

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Institutionen för husdjurens miljö och hälsa
Avdelningen för etologi och djurskydd**

Skara 2012

Studentarbete 408

**Swedish University of Agricultural Sciences
Department of Animal Environment and Health
Section of Ethology and Animal Welfare**

Student report 408

ISSN 1652-280X



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Nyckelord: Standardbred, trotter, racing, welfare, risk, assurance program

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SUMMARY

According to the basic values of the Swedish Trotting Association the horse and its welfare should always be held in highest consideration. One part of the animal welfare work in the organization is to ensure good horse management practices by controlling all active trainers through the local licensing committees situated at the Swedish racetracks. The Swedish Board of Agriculture stated that high quality animal welfare assurance programs used by the industry organizations can be used in the risk assessment of the official animal welfare control to make the official control work more effective and the ambition of the Swedish Trotting Association is to establish an animal welfare assurance program which may be approved by the Swedish Board of Agriculture. Racehorses are exposed to welfare hazards both in their management as well as during training and racing and factors like handling, training, feedstuff, stable environment, medication and the possibility to express natural behavior all affect the welfare of the horses.

The aim of the project is to investigate and evaluate the animal welfare work performed by the licensing committees and to give advice on how to improve the industry's animal welfare control. A questionnaire was sent out to all licensing committees and the results showed that they were in general satisfied with their work situation and their ability to communicate with the trainers but that they were not offered enough education in animal welfare with relevant legislation and disease control as the most mentioned gaps of knowledge. A majority of the committees believed that the committees over the country were not unified in their judgments and they felt a need for more active support from the Swedish Trotting Association. 39 % of the committees failed to control their trainers within the correct time interval.

There is room for improvements in the animal welfare audits of the Swedish Trotting Association. The auditors need to be well educated and updated on animal welfare standards and legislation and their work needs to be standardized over the country. The protocol and control points need to be updated and web based tools could be extended and used for both distribution of information and reporting of auditing results. The auditors would function as a second-party control through their audits of the trainers and their animal management and their work should be revised by a third party control. Animal welfare work is a constantly ongoing process and a well-functioning animal welfare assurance program needs to be continuously evaluated and updated to meet the demands of today and to function as a useful tool in preventing animal welfare concerns.

SAMMANFATTNING

Enligt Svensk Travsports värdegrund ska hästen och dess välfärd alltid stå i centrum. En del av djurskyddsarbetet i organisationen är att säkerställa en god djurhållning genom att kontrollera alla aktiva tränare genom de lokala licenskommittéerna som finns vid de svenska travbanorna. Jordbruksverket har konstaterat att branschernas egna kontrollprogram för djurvälfärd kan, om de är av tillräckligt hög kvalitet, användas i riskbedömningen i den offentliga djurskyddskontrollen för att göra den mer effektiv och ambitionen för Svensk Travsport är att etablera ett djurskyddskontrollprogram som kan godkännas av Jordbruksverket. Travhästar är utsatta för välfärdsrisker i så väl stallmiljön som under träning och faktorer som hantering, träningsrutiner, foder, närmiljö, medicinering och möjlighet att utöva naturligt beteende påverkar hästarnas välfärd.

Syftet med projektet är att undersöka och utvärdera det djurskyddsarbete som utförs av licenskommittéerna och att ge förslag på hur djurskyddskontrollen i branschen kan förbättras. En enkät skickades ut till alla licenskommittéer och resultaten visade att de i allmänhet var nöjda med sin arbetssituation och sin förmåga att kommunicera med tränarna, men att de inte erbjöds tillräckligt med utbildning i djurskydd med relevant lagstiftning och smittskydd som de vanligaste nämnda kunskapsluckorna. En majoritet trodde att de olika licenskommittéerna över landet inte var enhetliga i sina bedömningar och de kände ett behov av mer aktivt stöd från Svensk Travsport. 39 % av licenskommittéerna lyckades inte kontrollera sina tränare inom rätt tidsintervall.

Det finns utrymme för förbättringar i branschens djurskyddskontroll. Kontrollanterna måste vara utbildade och uppdaterade inom djurskydd och relevant lagstiftning och deras arbete behöver likriktas över landet. Besöksprotokollet och kontrollpunkterna behöver uppdateras och de webbaserade verktyg som finns kan utökas och användas både för distribution av information och för rapportering av kontrollresultat. Kontrollanterna skulle fungera som en andrapartskontroll genom sin kontroll av tränarna och deras djurhållning och deras arbete bör i sin tur ses över av en tredjepartskontroll. Djurskyddsarbete är en ständigt pågående process och ett välfungerande djurskyddskontrollprogram måste utvärderas och uppdateras kontinuerligt för att kunna möta de aktuella krav som finns och fungera som ett användbart verktyg i det förebyggande djurskyddsarbetet.

BACKGROUND

According to the basic values of the Swedish Trotting Association the horse and its welfare should always be held in highest consideration (Swedish Trotting Association, 2010a). One part of the animal welfare work in the organization is to ensure good horse management practices by controlling all active trainers through the local licensing committees situated at the Swedish race tracks (Swedish Trotting Association, 2010b). A check list with 18 control points (see Appendix 1) regarding stable environment, the condition of the horses, outdoor areas and other management practices, is used for the audits (Swedish Trotting Association, 2010b). Professional trainers are visited once a year by the licensing committee and amateur trainers at least once every fifth year (Swedish Trotting Association, 2010b). Other types of stables, for example stud farms and convalescence stables are not controlled on a regular basis (Swedish Trotting Association, 2010b). If there are reasons to suspect poor horse management and welfare risks, unannounced audits can be carried out whenever needed in all types of stables (Swedish Trotting Association, 2010b.) The local County Administrative Board is responsible for the official animal welfare control and should always be contacted by the licensing committee if severe welfare concerns are found (Swedish Trotting Association, 2010b).

In 2008 the Swedish Board of Agriculture published report No. 2008:24 by Barchiesi *et al.* as a result of an investigation carried out on the behalf of the Swedish government, on how parts of the official animal welfare control in Sweden possibly could be rationalized. One way of making the official animal welfare control more effective is to take advantage of the animal welfare assurance programs used by different animal industry organizations and the Swedish Board of Agriculture stated that these kind of programs could be used in the risk assessment of the official control if the quality of the programs is high enough (Barchiesi *et al.*, 2008). Animal welfare assurance programs should have higher demands on animal care and welfare than the minimum requirements of the Animal Welfare act and compliance with both the rules of the program and the animal welfare legislation must be controlled (Barchiesi *et al.*, 2008). Moreover the program itself needs to be revised and approved by the Swedish Board of Agriculture before it could be used as a control program (Barchiesi *et al.*, 2008). Animal owners connected to an approved animal welfare assurance program can get longer control intervals in the official animal welfare control leading to lower administrative costs (Barchiesi *et al.*, 2008).

Three possible solutions are presented in the report; **1.** The control of the compliance of the animal welfare assurance program is performed through a second- or third-party control engaged by the industry organization. The County Administrative Board or the Swedish Board of Agriculture determines if the animal owner gets to apply special legislation. The official animal welfare control is performed by the County Administrative Board. **2.** The control of the compliance of the animal welfare assurance program is performed through a third-party control engaged by the industry organization. The auditor determines if the animal owner gets to apply special legislation. This means that exercise of public authority is delegated to the third-party control. The official animal welfare control is performed by the County Administrative Board. **3.** The control of the compliance of the animal welfare assurance program is performed by an accredited control body engaged by the industry organization. The accredited control body determines if the animal owner gets to apply special legislation. This means that both exercise of public authority and performance of parts of the official animal welfare control are delegated to the accredited control body. Requirements of actions due to shortcomings cannot be delegated to the accredited control

body. The parts of the official animal welfare control not included in the animal welfare assurance program are controlled by the County Administrative Board. The County Administrative Board determines which actions to take if shortcomings in the compliance of the animal welfare legislation are found.

Today there are only a few industry organizations which have an animal welfare assurance program approved by the Swedish Board of Agriculture where the animal owners commit to follow higher standards in their animal management than demanded in the animal welfare legislation (Barchiesi *et al.*, 2008). Two examples are the industry organizations Swedish Egg Producers Association and Swedish Poultry Meat Association, where the producers get to apply special legislation in form of higher stocking density if they follow the regulations of their programs (Barchiesi *et al.*, 2008). Point systems are used for grading the quality of animal management, disease control, food handling and construction and formation of buildings and the national standards officers are consulted by the organizations (Barchiesi *et al.*, 2008). There is no board of appeal if an animal owner disagrees on the judgment but the animal owner can require a new control visit (Barchiesi *et al.*, 2008). It is voluntary to participate in the programs but it gives the producers such great economical advantage so it is indirectly compelling, moreover there are dealers, insurance companies and others that require participation from the producers before they can deliver eggs or insure their animals (Barchiesi *et al.*, 2008). The Swedish Trotting Association is planning to update and renew the animal welfare control both on race days and at farm level by applying a new system for checking the pre-race health status of the horses and by evaluating and improving the auditing visits performed by the licensing committees today (G. Åkerström, Swedish Trotting Association, pers. comm. 2012-03-22). The ambition is to develop an animal welfare assurance program which may be approved by the Swedish Board of Agriculture (G. Åkerström, Swedish Trotting Association, pers. comm. 2012-03-22).

In 2009 the Swedish government determined that the content and formation of the Animal welfare legislation needed to be investigated to give an overview of the current legislation for the future work of creating a modern and flexible legislation (Ministry for Rural Affairs, 2009). One area mentioned of special interest to this project was animals used for training and competition since the 17th paragraph of the Animal Welfare Act (1988:534), declares that animals must not be exposed to any suffering during training and competition (Ministry for Rural Affairs, 2009). The final report from the investigation of the animal welfare legislation states that the basic needs of animals always needs to be fulfilled before the animal management practices could be considered as ethical acceptable (Ministry for Rural Affairs, 2011). The investigator proposes several changes in the legislation that affect the trotting industry. The use of possible harmful equipment should be regulated in the animal welfare legislation, the whip should only be used for mild corrections that do not cause the horse pain or suffering, genetic diseases and defects that can cause animal welfare concerns should be prevented, the veterinary examination of horses at race days has to be improved and the official veterinarians responsible for the animal welfare at race days need to be more educated and standardized in their work (Ministry for Rural Affairs, 2011). Another area of special interest for this project is whether the industries' own animal welfare assurance programs could complement or even replace the official animal welfare control. The investigator of the animal welfare legislation refers to what has been said in the earlier report on animal welfare control done by the Swedish Board of Agriculture (Report 2008:24 by Barchiesi *et al.*, 2008) with the addition that this question is being

further discussed at the Ministry for Rural Affairs. One possible complication mentioned is whether these types of control program will harmonize or not with the precepts in the Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules.

AIM

The aim of the project is to investigate and evaluate the animal welfare work performed by the licensing committees and to give advice on how to improve the industry's animal welfare control. The following questions are investigated; Which difficulties do the licensing committees experience in their animal welfare control work today? What can be done to improve the animal welfare work? Which welfare hazards are there in the management of racehorses? How can an effective and useful animal welfare assurance program be established?

MATERIAL AND METHODS

The questionnaire

The questionnaire and its content were formed in collaboration with the supervisors of the project. The questionnaire was divided into three parts; *Composition and competence of the committee*, *Work* and *Perspectives* with a total of 28 questions. The first part gave an overview for the composition of the committees, their education and other experiences which could be useful and relevant when working with animal welfare. The working situation and routines of the committees were in focus in the second part while the third part was dedicated to the committees own opinions on their own work and its future. Only one question had answering alternatives, all other were open questions.

The questionnaire was sent out by e-mail to the sports director or to any other responsible person at the sports department at the 28 Swedish racetracks that grant training licenses. The contact details were found on the web page of each racetrack. The questionnaire was distributed to all racetracks on January 3, 2012 and a reminder was sent out at three occasions, two, six and nine weeks after the first distribution. The answers from most committees were collected during telephone interviews, a few committees gave their answers via e-mail. The collected data was compiled in Microsoft Office Excel and the descriptive statistics were calculated in the same program. If an approximate value were given by the respondents its mean value was used for the calculations.

Literature, study visits and seminars

A review of relevant literature considering equine welfare, welfare hazards and animal welfare control in combination with study visits and seminars gave valuable information for this study. The objective of the study visits was to get insight on how different control systems were used in practice. Four study visits in different parts of Sweden have been performed during this project. Two of the licensing committees, Halmstad and Färjestad, were followed in their animal welfare control work for one day each. One visit was paid to a trainer together with the County Administrative Board of Stockholm during an official animal welfare control. Finally an egg farm was visited together with the national standards officer for the animal welfare assurance program of the Swedish Egg Producers Association.

Following seminars and conferences were attended; The Welfare Quality Project, seminar at the Swedish University of Agricultural Sciences, October 4, 2011, Uppsala. Risk-based animal welfare assessment, seminar at the Swedish University of Agricultural Sciences, November 21, 2011, Skara. Education of official racing veterinarians, a two day course at the Swedish Trotting Association, November 22 and 23, 2011, Stockholm. The Animal Welfare Conference by the Swedish Board of Agriculture, December 1, 2011, Stockholm.

RESULTS

The questionnaire

The questionnaire was sent out by e-mail to all the 28 racetracks that grant training licenses in Sweden. All 28 responded to the questionnaire, yielding a response rate of 100 %. The results are based on the answers of the licensing committees and the questions are presented in the same order as in the questionnaire. Two abbreviations will be used repeatedly in the text; STA stands for the Swedish Trotting Association and CAB stands for the County Administrative Board.

Composition and competence of the committee

1. Number of members?

The 28 committees engaged 112 members in total. The number of members per committee ranged from 3 to 8 with a median of 3 members and an average of 4 members.

2. For how many years have the different members served on the committee?

The members of all committees had served from 0 to 33 years with a median of 5 years and an average of 7 years.

3. How are new members selected?

26 committees gave clear answers on how the proposal and approval of new members are done and the routines differed among the committees. Twelve committees said that the committee always had certain representatives while two committees reported that only the Sports director was a constant member. Five committees had no clear representatives at all and nine committees did not mention whether they had clear representatives or not. The local trainer associations, the local horse owner associations and the sports director were the most common representatives. The most common routines were that new members were proposed by the committee itself or the sports director and/or the race track manager and finally approved by the board of the racetrack.

4. What education have you received regarding control work and animal welfare from the Swedish Trotting Association or elsewhere?

Most of the committees had received education from the Swedish Trotting Association at only one or two occasions, see figure 1. Moreover, four committees had arranged meetings with the local County Administrative Board (CAB) at one or two occasions and one committee had arranged meetings with both the local CAB and the local Rural Economy and Agricultural Society at two occasions while two committees answered that they had arranged own education meetings at one or two occasions.

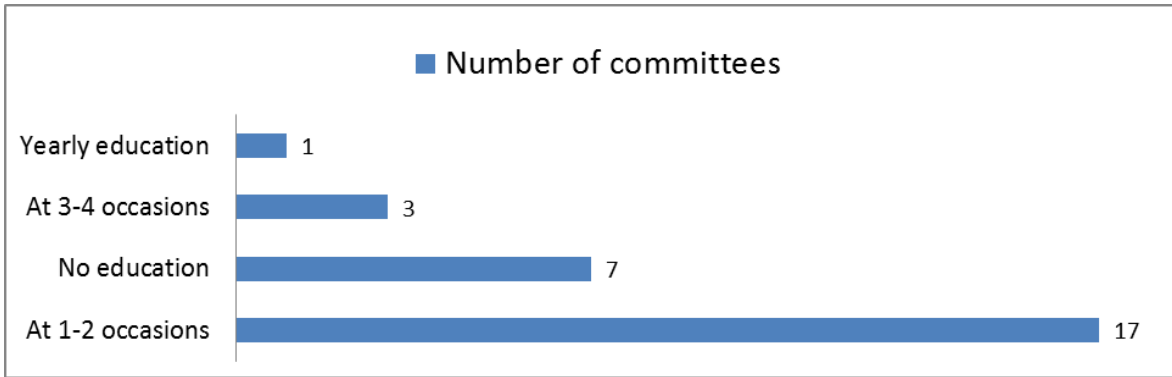


Figure 1. The figure illustrates how often the different licensing committees had received animal welfare education from the Swedish Trotting Association.

5. Which level of knowledge (poor, fair or good) do you think you have within:

- a) Animal welfare b) Disease control c) Animal welfare legislation d) The horse as a species and individual e) Durability of horses?**

Nearly all committees valued their knowledge as fair or good in all given categories. Two committees valued their knowledge in animal welfare legislation as poor and one committee valued their knowledge in durability of horses as poor. The complete results are shown in table 1.

Table 1. Each number represents how many committees that placed themselves in each evaluation category.

| Subject | Poor | Fair | Good |
|---------------------------------------|------|------|------|
| Animal protection | | 5 | 23 |
| Disease control | | 13 | 15 |
| Animal welfare legislation | 2 | 13 | 13 |
| The horse as a species and individual | | 3 | 25 |
| Durability of horses | 1 | 3 | 24 |

6. Describe the members' experiences that are valuable in animal welfare control work?

27 committees answered the question since 1 committee was under renewal and not able to give complete answers. Some committees had several members with the same specific experience. Relevant academic education was rare while the industry experience was well represented in the committees. Complete results on the members' experiences are shown in table 2-4.

a) Education

Table 2. The table illustrates how many committees and members in total all over the country that had a certain education.

| Education | Number of committees | Members in total |
|------------------|----------------------|------------------|
| Veterinarian | 3 | 3 |
| Police | 1 | 1 |
| Lawyer | 1 | 1 |
| Media journalist | 1 | 1 |

b) Industry experience

Table 3. The table illustrates how many committees and members in total all over the country that had a certain industry experience.

| Industry experience | Number of committees | Members in total |
|---------------------------------|----------------------|------------------|
| Amateur trainer | 26 | 47 |
| Professional trainer | 20 | 27 |
| Educator licensing courses | 11 | 16 |
| Race day staff | 10 | 11 |
| Sports director | 8 | 8 |
| Groom/apprentice | 6 | 7 |
| Active in industry associations | 4 | 7 |
| Farrier | 3 | 3 |
| Active in equestrian sports | 2 | 2 |
| Jockey, thoroughbred racing | 1 | 1 |

c) Other relevant experience

Table 4. The table illustrates how many committees and members in total all over the country that had a certain experience.

| Experience | Number of committees | Members in total |
|--|----------------------|------------------|
| Farm animal breeder | 4 | 4 |
| Farm buildings/construction | 1 | 1 |
| Slaughter | 1 | 1 |
| Animal transporter | 1 | 1 |
| Horse management teacher (High school) | 1 | 1 |
| Care of problematic persons (drug abusers) | 1 | 1 |

7. How do you hand over tasks to new members, is there an introduction?

21 committees answered that they had an introduction, 5 committees answered that they did not have an introduction and 2 committees were unsure if there was an introduction or not. Information to new members was transferred written, orally or during audits performed together with a more experienced member. Combinations of these methods were common, see figure 2.

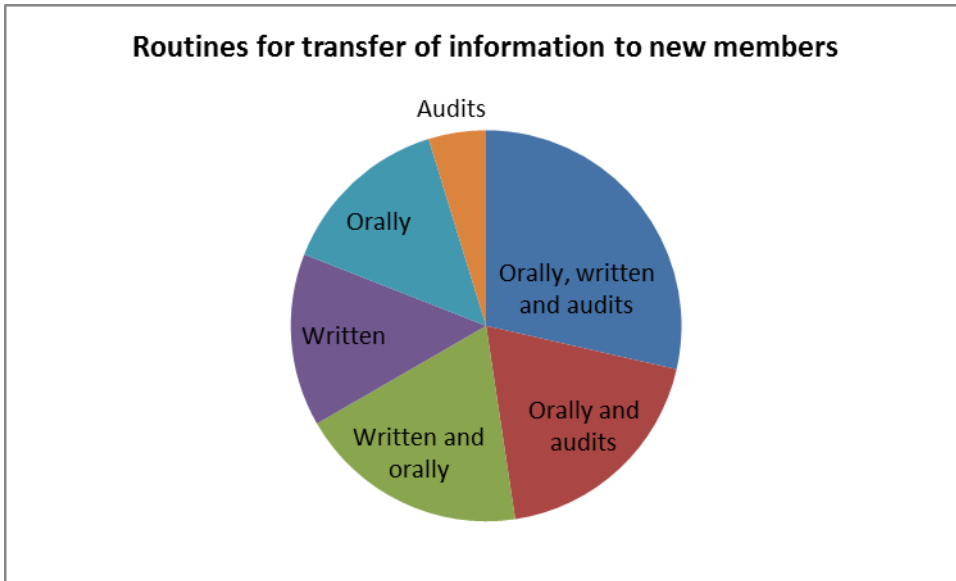


Figure 2. Distribution of routines for transfer of information among the licensing committees.

8. Is there a veterinarian linked to the committee and what kind of collaboration do you have? Is the veterinarian also an official racing veterinarian?

Twenty committees (71 %) had a specific veterinarian linked to the committee and eight committees (29 %) had not.

Sixteen committees asked their veterinarian for advice in specific issues or animal welfare cases, one committee performed some of the audits together with their veterinarian and three committees had a veterinarian as a permanent member. Nine of the veterinarians were official racing veterinarians, seven worked at a private practice, one was a county veterinary officer, one was a district veterinarian and one was a retired official racing veterinarian and one committee asked the veterinarians at the Swedish Trotting Association (STA) for advice.

9. How would you describe *Animal protection* in own words?

Most of the committees gave several answers to this question. The most common answer was that animal protection means to secure or control different factors with the wellbeing of animals and a suitable environment as the most frequent factors. See table 5 for a complete list. A few answers differed from the ones presented in table 5. Three committees described animal protection as using common sense and to be a friend of animals. One committee described animal protection as the most important task of the committee while another one answered that animal protection means that the auditor is a representative of the animals since they are dependent of humans.

Table 5. Factors that needs to be controlled or secured in animal protection according to the licensing committees.

| Factor | Committees | Factor | Committees |
|-----------------------|------------|-----------------------------|------------|
| Wellbeing of animals | 17 | Ethical treatment | 2 |
| Suitable environment | 7 | Compliance with regulations | 2 |
| All affecting factors | 5 | Protected from suffering | 2 |

| | | | |
|-------------------------|---|----------------|---|
| Correct care/treatment | 5 | Body condition | 2 |
| Health status | 3 | Daily turnout | 1 |
| Natural needs fulfilled | 3 | Medication | 1 |
| Feed and water | 3 | Equipment | 1 |
| Correct training | 2 | Hoof care | 1 |

10. How do you see your own role in the animal welfare work in the industry?

The committees gave several answers to this question and a majority of 22 committees used the word important when describing their role. All answers are presented in table 6.

Table 6. How the committees see their own role in the industry's animal welfare work.

| Description | Committees |
|--|------------|
| An important role | 22 |
| Animal welfare is a debated issue, demands are increasing | 6 |
| Help trainers to improve horse management | 6 |
| Audits are performed for the best of the horses | 4 |
| Prevention of animal welfare issues | 4 |
| Finding and correcting shortcomings | 3 |
| Prevent inappropriate persons from keeping horses | 3 |
| Be role models in horse management | 2 |
| Ensure that regulations are followed | 1 |
| Be the "voice of the horse" | 1 |
| Keep the sport clean and fair | 1 |
| Provide trainers with information about animal welfare legislation | 1 |
| Do the work of the local CAB | 1 |

11. Have you received any further education in animal welfare during your time at the committee? What and how often?

21 committees answered that they had received no further education in animal welfare. Three committees mentioned that they had members working as instructors at the licensing courses and that animal welfare issues are discussed as a part of the education of the instructors. Three committees answered that they had received further education yearly or every other year from the Swedish Trotting Association. One committee pointed out that the education meetings with the local County Administrative Board already mentioned in question 4 is a form of further education.

Work

12. Number of control objects in your area? How many professional- and amateur trainers are there? Other cases like stud farms?

The number of professional trainers ranged from 2 to 56 with a median of 12 and an average of 15. The number of amateur trainers ranged from 37 to 400 with a median of 162.5 and an average of 177. The committee with the highest number of both professional and amateur trainers controlled both trotting trainers as well as Thoroughbred trainers in the area.

Six committees mentioned that they had visited breeders at one or two occasions while one committee said that breeders and their breeding stock are visited on a regular basis if they also have a training license. Four committees had visited no longer active trainers at one or two occasions when animal welfare concerns were suspected.

13. Number of work hours, travel time and expenses for audits per year?

There were large variations in resources spent and several committees could not answer this question partly or at all. 19 committees could report how many work hours they spend in total on performing audits every year. The committees spent 33-600 hours in total per year with a median of 92 hours and an average of 122 hours per year (n=19).

The travel time was estimated in distance or time by only nine committees and a view of the travelling situation of the committees could therefore not be presented. 21 committees had counted on their expenses and the committees used 700-90 000 SEK per year for control work with a median of 15 000 SEK and an average of 23 152 SEK. Four committees pointed out that the members are not compensated for the work hours they spend and the audits are performed as voluntary work.

When looking at expenses in relation to number of active trainers to get a comparison, the committees used 4-296 SEK per trainer and year with a median of 80 SEK and an average of 110 SEK. Three of the committees highlighted the fact that all trainers, both professional and amateurs, were visited during the same year and that the expenses were higher than usual.

14. Are all trainers controlled within correct time interval?

17 committees (61 %) answered that all trainers are visited within the correct time interval while 11 committees (39 %) did not control the trainers within the correct time interval.

15. How do you experience your work situation?

26 committees experienced their work situation as generally good. One committee described that their working situation could be problematic at times and one committee gave no clear answer to whether they experienced their work situation as good or not. Other comments to this question are presented in table 7.

Table 7. Comments on how the committees experience their work situation.

| Experience | Committees |
|--|-------------------|
| Audits are performed by at least two persons | 14 |
| Safe work situation | 7 |
| Feel welcome by the trainers | 7 |
| Nice/fun work | 6 |
| Audits are performed by one person | 5 |
| One member takes more responsibility than the others | 1 |
| GPS-coordinates for control sites would be useful | 1 |
| Hard when your competence is questioned | 1 |
| No effective follow up routine | 1 |
| Not enough resources reserved | 1 |
| The auditor is a person in authority | 1 |

16. How do you experience your own committee?

A majority of the committees had a positive picture of their own committee. A majority of 21 committees described themselves as fair-minded and 8 committees felt that their committees were well functioning. See table 8 for complete answers.

Table 8. How the committees experienced their own committee.

| Opinion | Committees | Opinion | Committees |
|---|------------|-----------------------------|------------|
| Fair-minded | 21 | Higher demands than the CAB | 1 |
| Well-functioning | 8 | Engaged | 1 |
| Using our instinctive feel | 4 | Unanimous | 1 |
| Nice/humane | 4 | Reputable | 1 |
| Strict if necessary | 2 | Responsive | 1 |
| Focus on the horses | 2 | Unfair in judgments | 1 |
| Help trainers to improve horse management | 2 | Replace members too seldom | 1 |
| Up to date | 2 | Meet too seldom | 1 |
| Reliable | 1 | Unstructured | 1 |

17. How do you experience the protocol, the reporting and the feedback?

24 committees experienced the protocol, the reporting and the feedback as generally good. Two committees experienced the protocol, the reporting and the feedback as partly poor and the final two committees expressed no clear opinion on whether they experienced it as good or not. A majority of the committees used the Sportsystem, a web based data system from the STA, in the control work, see figure 3. There is room for improvements in the Sportsystem according to the committees. There should for example be a connection between trainers, training facilities and reported shortcomings and the Sportsystem should notify in advance which trainers to visit during the coming year.

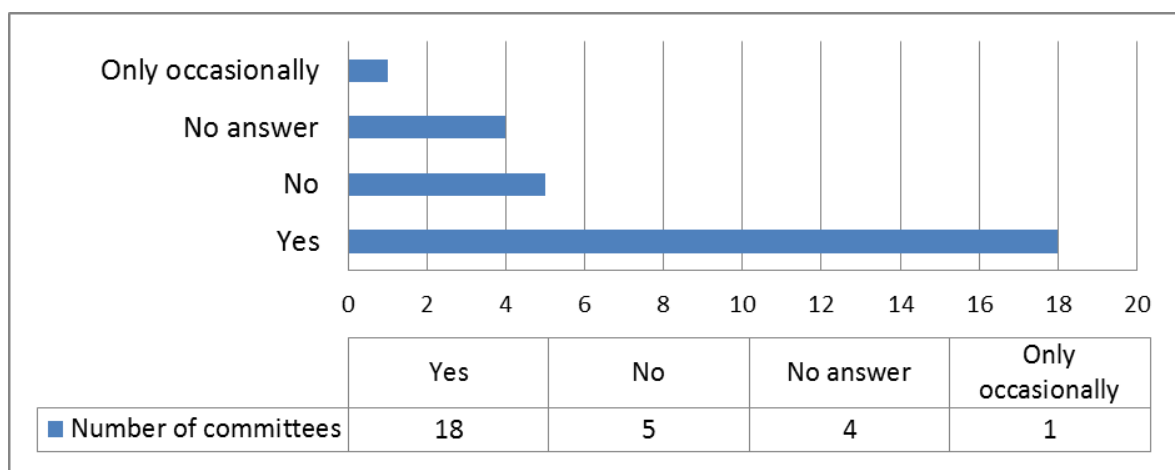


Figure 3. Distribution of the committees use of the Sportsystem.

18. Which ability to communicate with trainers do you think you have in your committee?

All 28 committees thought that they could communicate well with the trainers.

19. How unified do you think your judgments in the control work are? Are there differences in the judgments of different members? Do you think that all committees in the country would do the same judgments?

26 committees (93 %) thought that they were unified in their judgments while 2 committees (7 %) said that judgments differed from person to person in the committee.

6 committees (21 %) assumed that all committees over the country would do the same judgments, 15 committees (54 %) said that there are probably differences in judgment among committees and 7 committees (25 %) had no opinion or experience in this question.

20. What support do you have from the Swedish Trotting Association?

20 committees said that there is not much active support from the Swedish Trotting Association but there is a possibility to good support if the committee asks for advice in specific cases. Three committees thought that the support was generally good. Three committees said that the support was limited while one committee said that they did not get any support at all. One committee had not asked for any support and had therefore no specific opinion. Moreover, 13 of 28 committees added that they would like to have more education meetings arranged by the Swedish trotting Association.

21. Do you have special routines for how to act when you discover serious animal welfare issues, suspect a crime or in urgent animal welfare cases?

22 committees reported serious and urgent animal welfare issues to the local County Administrative Board (CAB). Some of these 22 committees would also inform the Swedish Trotting Association (STA) or their official racing veterinarian at the same time. Three committees preferred to contact only the official racing veterinarian or another veterinarian when serious animal welfare issues were discovered while two other committees reported this kind of errands primarily to the STA. One committee said that they did not have a routine on how to act.

Several committees pointed out that the routine can vary depending on the character of the errand. Suspension of licenses, cases that concerns medication of horses and other issues that mostly concerns the own regulations of the STA were often primarily discussed in the committee or together with the STA or the racing judge.

22. What contact do you have with the County Administrative board?

15 committees described the contact as good. Seven committees said that they had only limited contact or no contact at all. Two committees thought that the contact was partly poor while one committee experienced the contact as mainly poor. Three committees did not express any obvious opinion on whether the contact was good or poor. About half of the committees had some kind of preventive contact with the CAB but several committees reported that it was hard to get information and control results from the CAB. A few

committees even reported that the local CAB did not inform them if shortcomings were found in the official control or if a trainer was banned from keeping animals

23. How does the internal animal welfare work function at your racetrack?

24 committees described the internal animal welfare work was well functioning. Two committees had no opinion since their race tracks hire most of the staff from other tracks for the race days. One committee said that the work is probably not functioning at all due to internal conflicts while another committee said that it functions as good as it can do given the amount of resources spent.

18 of the 28 committees described the staff and/or the trainers as skilled and knowledgeable and that they know where to turn to if they discover ongoing animal welfare issues. Only four committees reported that there was some kind of preventive routines like meetings with trainers or race day staff.

Perspectives

24. What can be improved in the animal welfare control work?

Five committees were not sure or chose not to answer the question. The 23 committees that answered the question presented various different suggestions on how the animal welfare work could be improved. More education and/or an up-date of the knowledge of the committees and more meetings with other committees for discussion and standardization of their work were the most requested improvements. All improvements suggested by the committees are shown in table 9.

Table 9. Suggestions on how the animal welfare work can be approved according to the committees. "Aware animal welfare issues" means that these issues should be raised and discussed among committees and trainers.

| Improvement | Committees | Improvement | Committees |
|--------------------------------------|-------------------|-------------------------------------|-------------------|
| More education/updating | 14 | Sum up important legislation | 1 |
| Standardization | 9 | No active trainers in the committee | 1 |
| More collaboration with CAB | 3 | Perform doping tests during audits | 1 |
| Visit amateur trainers more often | 2 | Check horse passports | 1 |
| Clear guidelines for control work | 2 | Check health journals | 1 |
| Inform trainers about animal welfare | 2 | Better follow-up routines | 1 |
| Aware animal welfare issues | 1 | Perform audits during wintertime | 1 |
| Reserve more resources | 1 | Check foreign horses in Sweden | 1 |
| STA should organize the work more | 1 | Develop a better data system | 1 |

25. How would you like your role in the animal welfare work to develop?

Two committees were satisfied with their role, two committees chose not to answer the question at all and one committee was not sure what to answer.

A majority of the committees that answered this question wanted to be more educated in the future and one mentioned animal welfare legislation as a special area of interest. Several committees wished to meet other committees to standardize their work and to have

more contact with the Swedish Trotting Association. Some committees pointed out that information about animal welfare, disease control and the basic values of the Swedish Trotting Association should be distributed to all trainers. See the committees' complete perspectives in table 10.

Table 10. The committees' perspective on how they want their role to develop.

| Perspective | Committees | Perspective | Committees |
|--------------------------------------|-------------------|---|-------------------|
| Be more educated/updated | 16 | Legal advice wanted | 1 |
| Meetings/standardize the work | 6 | Have a good welfare assurance program | 1 |
| More contact with STA | 4 | Support from experienced auditor wanted | 1 |
| Inform trainers | 3 | Financial support from STA needed to improve audits | 1 |
| More collaboration with CAB | 2 | Offer further education to trainers | 1 |
| Our committee should meet more often | 1 | Educate older trainers without licensing education | 1 |

26. What important qualities and skills should be held by a person performing audits?

The committees often mentioned experience in horses and horse racing, ability to communicate and integrity as important qualities that should be held by an auditor. See table 11 for a complete list.

Table 11. Important qualities and skills mentioned by the committees.

| Qualities and skills | Committees | Qualities and skills | Committees |
|--|-------------------|--|-------------------|
| Experienced in horses | 17 | Objective | 2 |
| Able to communicate | 13 | Be up to date with relevant information | 2 |
| Knowledgeable in horse racing | 11 | Straight & honest | 2 |
| Integrity | 10 | Experienced in animal management | 2 |
| Knowledgeable in legislation/regulations | 7 | Follow work instructions | 1 |
| Nice/humane | 5 | Knowledgeable in medication of horses | 1 |
| A good judge of character | 4 | Look at the whole perspective | 1 |
| Fair-minded | 4 | Knowledgeable in veterinary science | 1 |
| Have an eye for animals | 4 | Keep confidentiality | 1 |
| Non-threatening | 3 | Be familiar with the control region | 1 |
| Use common sense | 3 | Knowledgeable in horse training | 1 |
| Try to improve horse management | 3 | Been professionally active in the industry | 1 |
| Experienced in control work | 3 | Experienced in animal welfare work | 1 |
| Knowledgeable in farm buildings/construction | 2 | Focus on the horses | 1 |

27. Which gaps of knowledge do you think there are in your committee today?

Seven committees chose not to answer the question and four committees thought that they did not have any gaps in their knowledge. 17 committees shared their opinion and the results are shown in table 12.

Table 12. The gaps of knowledge mentioned by the committees. "Authorization" means that the committee was unsure of what they were allowed to say and do during auditing visits. "Basic knowledge in other animals" means that the committee wishes to have basic knowledge in evaluating the welfare status of other common animals.

| Subject | Committees | Subject | Committees |
|-----------------------------------|------------|----------------------------------|------------|
| Animal welfare legislation | 10 | New EU legislation | 1 |
| No further education/ not updated | 6 | Fire protection | 1 |
| Disease control | 5 | Transportation permission | 1 |
| How to best perform audits | 3 | Authorization | 1 |
| How to communicate | 1 | Basic knowledge in other animals | 1 |

28. Other comments, thoughts or tips?

The committees shared their thoughts and tips generously. The need for education of the committees, standardization of the work and risk-based control interval were especially highlighted by the committees. A shorter control interval for amateur trainers than the current interval of five years was requested by some committees and enough resources should be reserved for animal welfare audits. A better preventive contact with the County Administrative Board and follow up-controls on whether the committees have performed enough auditing visits or not, could also improve the animal welfare work in the industry. Several valuable tips on how the audits could be improved and how other routines could be used in the preventive animal welfare work were given by the committees and the complete answers are presented in appendix 2.

Literature study

Natural behavior and welfare

Housing and managing horses convey several possible threats to both equine welfare and health (Mills & Clarke, 2002). Development of stereotypies coupled to horse management practices (McGreevy, 2004), health issues caused by inappropriate training and racing (Evans, 2002) and poor knowledge about natural behavior and learning theory leading to reduced welfare (Waran *et al.*, 2002) are all examples of potential welfare hazards in the horses' environment. The five freedoms enounced by the farm Animal Welfare Council (FAWC) are often used for evaluating the welfare of contained animals (Mills & Clarke, 2002). The five freedoms that followed the Brambell report from 1965 are as follows. 1. *Freedom from Hunger and Thirst* - by ready access to fresh water and a diet to maintain full health and vigour; 2. *Freedom from Discomfort* - by providing an appropriate environment including shelter and a comfortable resting area; 3. *Freedom from Pain, Injury or Disease* - by prevention or rapid diagnosis and treatment; 4. *Freedom to Express Normal Behavior* - by providing sufficient space, proper facilities and company of the animal's own kind; 5. *Freedom from Fear and Distress* - by ensuring conditions and treatment which avoid mental suffering (Farm Animal Welfare Council, 2011). The model

of the five freedoms can be used to highlight areas where the welfare of animals could be compromised (McGreevy, 2004).

Horses are often kept under highly unnatural conditions (Endenburg, 1999). Horses are social herbivores that rely on companions for added safety and speed for self-preservation (McGreevy, 2004). They are grazing hindgut fermenters with a digestion system adapted for a high fibre diet and constant feed processing (Pagan, 2009). Free-ranging horses spend most of the day grazing and performing social behaviors (Endenburg, 1999). Since horses have evolved to forage frequently and locomote they are sensitive to fasting and restriction of movement (McGreevy, 2004). Even though free-ranging horses live in groups, our domesticated horses spend up to 23 hours a day in their stables, often socially isolated, because of lack of suitable open land or for safety reasons (Endenburg, 1999). Minimizing social interactions is done to protect horses from injuring each other (Endenburg, 1999), to the contrary not a single horse got injured in a recent study on introducing unfamiliar horses (Hartman *et al.*, 2009). Knubben *et al.* (2008) stated that injuries in horses managed in groups can be prevented by establishing stable groups and providing the horses with enough space and resources so dominant herd mates can be avoided. Since very little of the physical and behavioral needs of the horse has changed throughout the domestication process, it is relevant to consider how modern horse management and training affects its welfare and needs (Casey, 2002). Behavioral disorders are developed and performed by contained animals that are not able to control or cope with their environment (Mason, 1991) and they are generally regarded as signs of earlier or ongoing welfare problems (Wiepkema & Koolhaas, 1993). The development and performance of behavioral disorders like crib-biting, weaving and box-walking can be prevented or reduced by changing the horse's environment (Bachmann *et al.*, 2003). Direct physical social contact with other horses, free movement daily and good feeding practices including high amounts of roughage, low amounts of concentrate and routines preventing anticipation and stress in the horse at feeding time is recommended (Bachmann *et al.*, 2003). It is unlikely that any natural behaviors have been lost during domestication and therefore should fair and effective training and management be based upon the needs of the horse, not human convenience and traditional practices (Waran *et al.*, 2002). To accomplish this, understanding of natural behaviors, motivation, learning theory and the effects of early experience is essential (Waran *et al.*, 2002).

Humans have tended to overemphasize the importance of dominance in their relationship to horses (Goodwin, 1999). The social behavior of horses minimizes conflicts and form stable bonds since the membership of a group is essential for surviving in the wild (Goodwin, 1999). Dominance is of low importance and the natural equine response is avoidance (Goodwin, 1999). Establishing a co-operative relationship with the horse is more in line with its natural behavior than a relationship based on a constant appliance of dominance over the horse (Goodwin, 1999). To accomplish fair and effective training of horses one need to have knowledge about both equine behavior and learning theory (Waran *et al.*, 2002). It is common, even among experienced trainers in equitation, that learning theory is not understood and correctly applied during horse training (Warren-Smith & McGreevy, 2008). An incomplete understanding of learning theory can affect the horse negatively since opposing stimuli, wrong timing etc. can lead to a stress response (McLean, 2005). Horses are commonly trained with negative reinforcement which makes them sensitive for accidental punishments, if the pressure used in negative reinforcement is not released at the right moment you are less likely to get the wanted response from the horse

and the signal will be punishing (McGreevy & McLean, 2009). If horses experience pain or fear in training they are likely to learn ways to avoid the stimuli, for example frequent bucking or rearing caused by pain from inappropriate handling or equipment (Waran *et al.*, 2002). These behaviors are commonly considered as behavioral problems, not seldom met with punishment from the handler, though they in fact are natural responses to threatening situations (Waran *et al.*, 2002). Poor training and handling leads to problem horses that show fear responses and both the value and welfare of these horses are compromised (Waran *et al.*, 2002).

Welfare hazards in the horses' environment

To ensure that horses are free from pain, injury and disease, as stated in the third freedom (Farm Animal Welfare Council, 2011), their housing should be safe, secure and well-constructed without dangerous fittings (Mills & Clarke, 2002). There are several paragraphs in the Swedish Animal Welfare Agency's administrative provisions and guidelines (DFS 2007:6) on the keeping of horses, ref L101, which regulate the size and formation of horse stalls, however these figures are often based on experience, not scientific studies (von Wachenfelt *et al.*, 2011). Indications on stall construction and other things in the horses' environment being a possible welfare hazard can though possibly be found in a questionnaire study by Knubben *et al.* (2008) where kick and bite injuries in horses were studied. Of the 231 injuries that the horse owners reported were 78,4% associated with factors other than biting or kicking, such as poor footing or a fence (38%), the box stall (8%), terrain and hacking (13%), training (3.5%), competition (3.5%), transportation (3.0%) or other circumstances, such as a pitchfork injury or unknown events (9.1%).

Air quality can affect the health and welfare of horses (Holcombe *et al.*, 2001) and horses in conventional stables are exposed to far higher concentrations of airborne dust and endotoxins than horses kept on pasture (McGorum *et al.*, 1998). Contaminated air can include a variety of gases and dusts and the athletic performance of horses will be compromised by poor air quality since the demands on the respiratory system are high (Curtis *et al.*, 1996). Airborne contaminants can both cause primary respiratory disease and influence the severity of infectious respiratory disease (Curtis *et al.*, 1996). The air quality is affected by stable management practice since the concentration of particles is determined by the rate at which they are released into the air, the building volume and the ventilation rate (Curtis *et al.*, 1996). Poor stable hygiene and the use of straw and hay of low quality can contribute to higher levels of endotoxins and dusts in the air (McGorum *et al.*, 1998). Horses do not need warm housing conditions and maintaining a sufficient ventilation rate is far more important for the comfort and health of the horse (Mills & Clarke, 2002). The behavior, production capacity and hormonal activity of animals are affected by loud noises and the normal behavior pattern of the animals is disturbed (Algers & Strömberg, 1973). There is nothing that indicates that the reaction of animals differs from reaction of humans when subjected to high noise levels and therefore should animals not be kept in noisy stable environments (Algers & Strömberg, 1973). Sunlight stimulates hormonal activity, the reproduction cycle (Nagy *et al.*, 2000) and the production of vitamin D in the skin (Frape, 2010a) and its effect on growth and bone structure in young individuals (El Shorafa *et al.*, 1979). Artificial lightning in stables evidently affects the working environment, but it has also been shown that different lighting conditions can affect feed intake, reproduction, coat quality and even production in different farm animals (Mossberg & Andersson, 1981).

Feeding routines should be based on both behavioral needs and physical needs of the horse and a balanced, suitable diet is crucial for the welfare of all individuals (Davidson & Harris, 2002). Neglecting the needs of the horse by feeding a diet with low fibre content can result in undesirable physical and behavioral consequences like chronic wood-chewing, imbalance in the microbial fermentation and gastric ulceration (Pagan, 2009). The hygienic and nutritional quality of feedstuff can also affect the welfare of horses (Davidson & Harris, 2002), low quality feedstuff like poorly produced or fermented silages or forages containing poisonous plants can cause deficiencies or even toxicities (Frape, 2010b). Horses lose fluid through faeces, urine and evaporation and both intake of drinking water and water from feed compensate for these losses (Nyman & Dahlborn, 2001). Horses in training experience a regular loss of fluid and have a greater need for an adequate rehydration than resting horses (Nyman & Dahlborn, 2001). Horses generally prefer to drink from a bucket and the flow rate and mode of supply has a significant effect on water intake when automatic water dispensers are used (Nyman & Dahlborn, 2001). The horses preferred a flow rate on 8 litres per minute rather than 3 or 16 litres per minute in a Swedish study from 2001 (Nyman & Dahlborn, 2001).

Horses prefer to lie down in a bedded area and in a study from 1989 by Hunter & Houpt the ponies were never observed lying on the unbedded concrete floor. Ninomiya *et al.* (2008) concluded that bedding material is related to three of the *five freedoms*. Moisture, soft surface and air ammonia are coupled to *freedom from discomfort*, hoof disease and skin conditions are coupled to *freedom from pain, injury or disease* and resting and sleeping behavior are coupled to *freedom to express normal behavior* (Ninomiya *et al.*, 2008). The optimal bedding material does not cause hygienic problems in the stable, it absorbs ammonia and damp, it is economic and easy to manage (Airaksinen *et al.*, 2001). Inadequate stable hygiene causes damp conditions that increase the risk for softening of the horny laminae leading to a less effective protection of the hoof against infectious agents (Casey, 2002). However, today cracks in the horny laminae is probably more often caused by too dry conditions because of modern horse management where the horses spend most of their time in stables on very absorbent materials like wood shavings (Casey, 2002).

Environmental control can be successful in preventing parasitic and infectious disease where the agents survive and even proliferate outside of the host (Mills & Clarke, 2002). For example, the removal of faeces prevents spreading of both viruses which proliferate in faeces and internal parasites that can be found as larvae or eggs in faeces (Mills & Clarke, 2002). Other diseases, like the highly infectious and contagious viral respiratory disease Equine Influenza, are not capable of prolonged survival in the environment or even in individual animals and transmission among horses occurs via direct contact with nasal secretions, by the aerosol route or through contact with recently contaminated clothing, equipment, feeds or other (Townsend, 2003). The disease is common among racehorses and young horses are more susceptible than older the older ones (Townsend, 2003). Movement and mixing of horses from different facilities and close confinement are risk factors and outbreaks of Equine Influenza are prevented by correct vaccination programs, quarantine routines, good hygienic routines and early detection of horses shedding live virus (Townsend, 2003).

The Nordic climate demands long periods of storage for stable manure leading to high storing and disposal costs (Airaksinen *et al.*, 2001). The utilization of stable manure should be environmentally acceptable and a good manure management system is hygienic,

economical and easy to manage technically (Airaksinen *et al.*, 2001). Manure in outdoor areas for horses should also be managed correctly, high content of nutrients and microbes in surface water is prevented by removing manure from paddocks on a regular basis (Airaksinen, 2006). Drinking and eating areas are often more contaminated and special attention should be paid to cleaning these areas (Airaksinen, 2006). Weather conditions, stocking density, gradient of land, vegetation (Stout *et al.*, 2000), ground material and paddock management (Uusi-Kämppe *et al.*, 2007) affect the quality of runoff water. Cleaning the paddocks during wintertime has its hazards and more efficient methods are needed (Airaksinen, 2006). The manure should be used after treatment and storage as fertilizer, soil improvement material or for other suitable purposes (Airaksinen *et al.*, 2001).

When building and re-building horse stables these should be designed in a way that provides acceptable protection against fire and acceptable conditions to rescue horses in case of fire and the general advice is to follow the recommendations of the Swedish Fire Protection Committee of Agriculture (3 chap 25 § DFS 2007:6). There should also be an acceptable plan on how the welfare of the animals should be maintained at power outages (3 chap 26 § DFS 2007:6). 43 % of the turnouts to farming facilities by the Swedish emergency services are caused by fire incidents while 44 % of the turnouts are animal rescue operations (Emanuelsson, 2009). Examples of rescue operations are pulling up large farm animals like horses and cows trapped in streams and helping cast horses stuck in box-stalls (Emanuelsson, 2009). According to the Law on the prevention of accidents (2003:778) all private persons and entrepreneurs have a responsibility to protect life and property and not to cause accidents, in addition all companies regardless of size, activity or risk shall have systematical routines for fire protection (Federation of Swedish farmers, 2009). Some of the reported causes to stable fires are spontaneous combustion of hay, loose connections in the neutral screw, children playing with fire, charging of car battery outside the building, lightning strike and hot work on tar paper roof (Federation of Swedish farmers, 2009).

Welfare implications for the racehorse

The 17th paragraph of the Animal Welfare Act (1988:534), declares that animals must not be exposed to any suffering during training and competition. Using animals for training and competitions can be questioned since there is a concern that the prestige and the possibility of economical earnings could increase the risk of horses being pushed too hard (Ministry for Rural Affairs, 2011). The welfare and needs of the animals should always be considered regardless of what they are used for (Ministry for Rural Affairs, 2011). If this is done, the use of animals for competition should not cause larger ethical problems than any other purpose of animal management (Ministry for Rural Affairs, 2011). Cserhalmi (2004) points out that people in the world of horse racing today often depend on horses for their livelihood just like farmers in the 19th century depended on their work horses. This means that the way the horses are handled depends on the outcome of the conflict between production and empathy and that momentary violence towards the horse can increase its ability (Cserhalmi, 2004). In 1980 a trainer was accused of animal cruelty after repetitively beating of a Standardbred racehorse unwilling to move out of the stable on a race day (Cserhalmi, 2004). The outcome of the court case where the trainer was acquitted of animal cruelty indicates that beating the horse was found necessary by the court and that the participation in the race and the trainers wish to “master” the reluctance of the horse were more important than its welfare (Cserhalmi, 2004).

Racehorses are commonly cared for in an excellent manner with assigned grooms, regular health care and individual training programs and there are regulatory agencies that oversee the racing industry from an animal welfare point of view (Mundy, 2000). Despite this fact there are several welfare issues typical for this industry like performance-affecting substances, therapeutic medications, athletic injuries and life for horses after the racing career (Mundy, 2000). Arthur (2011) even concluded that the world of racing is filled with potential animal welfare hazards, and that not much is in direct favor of the horse. The horses compete near the limit of their physical ability, the safety margins are small, and the outcome is sometimes fatal (Arthur, 2011). There are several threats to the welfare of racehorses coupled to inappropriate training and preparation for competition and inadequate recovery (Evans, 2002). These threats can cause both minor and severe welfare implications such as lameness, fatigue during races and even chronic fatigue (Evans, 2002). Overtraining in horses is a state caused by continued excessive training and inadequate recovery leading to poor performance and weight loss (Evans, 2002). Exercise-induced pulmonary hemorrhage (EIPH) is one of the most common medical problems in Thoroughbred racehorses in the U.S., and severe cases of EIPH can cause massive internal bleeding into the lungs with fatal outcome (Mundy, 2000). Equine rhabdomyolysis syndrome, “tying-up”, is one of the most common muscle diseases and horses suffering from the syndrome show a stiff stilted gait and unwillingness to move (Collinder *et al.*, 1997). Rhabdomyolysis is probably caused by multiple factors, both environmental and genetic (Collinder *et al.*, 1997) and high starch diets (McKenzie *et al.*, 2003), the contrast in muscular activity in stabled horses used for challenging activities (Casey, 2002) and genetic predisposition (Collinder *et al.*, 1997) can contribute. There are not only changes in the physical health, both the behavior of the horse and its willingness to exercise are affected when appropriate recovery periods are not allowed (Evans, 2002). Several factors like conformation, routines in training and racing, adequacy of diagnosis and treatment of limb abnormalities and the condition of track surfaces contribute to occurrence of lameness and injury in Standardbred racehorses (Evans & Walsh, 1997). Important to point out is that the fatality rate of harness racing is much lower than of thoroughbred racing, mainly because of the fact the Standardbreds race at lower speeds and always have two legs on the ground (Arthur, 2011), and that most of the research focusing on health problem in racehorses has been performed in the Thoroughbred industry and because of the differences between the industries the results might not be directly applicable on Standardbreds (Vigre *et al.*, 2002).

Lameness is the most common health problem in racehorses (Evans, 2002, Vigre *et al.*, 2002) and the risk for lameness is increased within a period of five days after racing (Vigre *et al.*, 2002). Lameness could more often be seen in 3- and 4-year olds than in older horses indicating that older horses still racing have a sufficiently strong constitution that is essential for a long career (Vigre *et al.*, 2002). The distal limb is exposed to repetitive shocks and vibrations that can possibly cause mechanical stress (Chateau *et al.*, 2010). Track surfaces are a risk factor (Crevier-Denoix *et al.*, 2009, Chateau *et al.*, 2010, Mundy, 2000) and adaption and selection of appropriate ground surface can reduce injuries (Chateau *et al.*, 2010). Trainers chose track surface for training based on their own experience but there is a lack of scientific evidence (Chateau *et al.*, 2010). Measurements of shock impact and vibrations at fast trot have been done on a synthetic all weather wax track, a crushed sand track (Chateau *et al.*, 2009) on asphalt, on a wet sand beach and on a dry sand beach (Chateau *et al.*, 2010). Drier sand surfaces decrease the shock impact during landing, however the improved damping is often associated with a loss of efficiency during

the propulsion phase (Chateau *et al.*, 2010). The synthetic all weather wax track is probably more suitable for training than racing because its dampening characteristics are good but it reduces both the acceleration of the hoof during breakover and the stride length (Chateau *et al.*, 2009). Appropriate banking of semicircular curves is essential since underbanking causes gait asymmetries where the horse leans towards the center of the curves and shifts its hindquarter outwards resulting in the limbs needing to provide a lateral, centripetal force to overcome the inertial forces that tries to keep the horse travelling straight (Evans & Walsh, 1997). If the banking is optimal the horse does not lean in relation to the track surface meaning that stresses on the limbs are avoided (Evans & Walsh, 1997). An increase of banking from 4,8 to 5,7 degrees have been associated with a 22 % decrease in the rate of lameness and injury of horses after racing (Evans & Walsh, 1997).

Respiratory diseases and muscular problems were two other common reasons for interrupted training in Danish Standardbred racehorses (Vigre *et al.*, 2002). Interference-type injuries, lameness and sacroiliac pain were the most common abnormalities found on post-race veterinary examinations of poor performing Australian Standardbreds (Knight & Evans, 2000). Two potential causes of different interference-type injuries are track design with insufficient banking as a possible risk factor, or gait abnormalities (Knight & Evans, 2000). Interference-type injuries caused by gate abnormalities are most likely not the main reason to poor race performance, they are probably just the result of other factors operating during the race (Knight & Evans, 2000). Other findings of importance in the post-race examinations were signs of poor recovery, exercise induced pulmonary hemorrhage, signs of respiratory tract disease, gluteal pain and mouth injuries (Knight & Evans, 2000). Knight and Evans (2000) concluded that attention should be paid to track design and correction of gaits by appropriate hoof trimming while the back of the horse should be considered as a potential site of problems during veterinary examination. Correct trimming and shoeing of the equine foot with its numerous functions including supporting the weight of the horse, dissipating the energy of impact, protection of inner structures within the hoof capsule, and traction, is of great importance on the performance and durability of the horse (O'Grady, 2008). Many veterinarians and farriers today claim that a large proportion of the lameness seen in horses could be prevented and treated through proper farriery (O'Grady, 2008). Both external and internal structures of the foot is affected by trimming and shoeing and the farrier needs to have a good understanding of basic farriery principles such as using the hoof pastern axis, the center of articulation, and trimming or shoeing to the widest part of the frog (O'Grady, 2008).

Racing 2-year old horses has been debated since there is a general concern that the horses are not mature enough to race (Knight & Thompson, 2011). Some studies have found that 2-year olds have a higher risk of injury, which may partly be associated with management issues related to training rather than simply physiological immaturity (Knight & Thompson, 2011). When risk factors for lameness in Danish Standardbred racehorses were investigated the results showed that horses had a reduced risk of injury if they had been under the care of one trainer for more than three months (Vigre *et al.*, 2002). This indicates that the trainer is a risk factor and that trainers tend to learn over time how to train a specific horse in an optimal way to prevent lameness (Vigre *et al.*, 2002). When studying the total career performance in means of prize money, number of starts and length of career no adverse effects of 2-year old racing could be identified (Knight & Thompson, 2011).

The varying level of knowledge in training methods and equipment among horse trainers is a welfare risk for the animals (Ministry for Rural Affairs, 2011). Inappropriate equipment can cause pain and injury (Casey, 2002) and equipment of poor quality can be a safety risk (Swedish Trotting Association, 2012b). One method or piece of equipment that is unharmful in the hands of an experienced trainer can cause great suffering if used or applied incorrectly by an unskilled trainer (Ministry for Rural Affairs, 2011). A questionnaire answered by 194 Swedish amateur- and professional trainers showed that trainers often have poor knowledge about the biology of the horse and animal welfare legislation (Johansson, 2011). The trainers seem to have overconfidence in their knowledge about animal welfare and there is need for both basic- and further education in animal welfare and the biology and ethology of the horse (Johansson, 2011).

The veterinary medical care in horse racing is of high quality but the interests of the trainer, owner, veterinarian and the horse are not always in concert (Arthur, 2011). The average Swedish trainer do not use veterinary health checks as a method to prevent injuries in their horses, while preventive massage therapy and other physiotherapy methods are applied 1-4 times a month (Siby, 2011). Joint injection is the first treatment that most of the Swedish amateur- and professional trainers use when treating lameness in horses (Siby, 2011). Few trainers answered that resting the horse is the first option even though it likely would be financially beneficial compared to the more expensive joint injection (Siby, 2011). The Swedish trainers reason totally different if a horse is overstrained, in that case almost all of the trainers would let the horse rest as the first treatment (Siby, 2011). Corticosteroids which are steroidal anti-inflammatories, are heavily used both systematically and intra-articularly as joint injections to treat specific health and soundness problems (Arthur, 2011). A repeated use of these drugs is coupled to long-term health concerns both systematically in general and on musculoskeletal structures when combined with hard training and racing (Arthur, 2011). Cortisones are often used when treating lameness in racehorses and reducing inflammation is beneficial in the short term but the underlying pathological condition is often left unchanged (David, 2008). In the U.S., where the medication regulations allows treatment with non-steroidal anti-inflammatory drugs and steroidal glucocorticosteroids prior to racing, there is a concern among the pre-race examining veterinarians that their ability to identify horses at risk for catastrophic injuries are compromised since the clinical signs of inflammation and pain in the horse is masked (David, 2008). Post-race drug testing and penalties for the responsible parties if performance-affecting substances are found, are used to prevent welfare issues and attempts to alter the outcome of race (Mundy, 2000). The prevalence of adverse findings in the drug tests is low and the authors own experience is that these findings often are a result of inappropriate or unintentional administration of legitimate medication mostly caused by human error (Mundy, 2000). Medicines stored in stables should be kept in a lockable storing space and be clearly marked with the name of the treated horse (Swedish Trotting Association, 2010b).

Animal-based welfare measures and risk assessment

The Welfare Quality project is the largest European research project on animal welfare that has ever been done and the main aims of the project were to develop a standardized system for the assessment of animal welfare and to find a standardized way to convey measures into animal welfare information (Blokhuis *et al.*, 2010). Resource- and management-based measures have traditionally been used in animal welfare assessment but the assessment system in the Welfare Quality project primarily consist of animal-based measures

(Blokhuis *et al.*, 2010). Using animal-based measures means that parameters like behavior, fearfulness, health and physical conditions are measured and the results can directly reflect the welfare status (Blokhuis *et al.*, 2010). Animal-based measures are sensitive to variations in management which makes them particularly relevant in welfare assessment (Blokhuis *et al.*, 2010). The assessment system should of course be complemented with resource- and management-based measures like stocking density, housing conditions and feeding routines when animal-based measures are not reliable enough or unavailable (Blokhuis *et al.*, 2010).

An equine welfare monitoring system based on the Welfare Quality framework is under evaluation and there are ongoing studies at several European universities (S. Viksten, Swedish University of Agricultural Sciences, pers. comm. 2012-01-19). A draft protocol has been tested and is now under revision (S. Viksten, Swedish University of Agricultural Sciences, pers. comm. 2012-01-19). Some work has been done in evaluating animal-based welfare parameters in horses before the Welfare Quality project. In 2005 Pritchard *et al.* published a study on evaluating the welfare of working horses in developing countries. A protocol based on behavior and health observation of working mules, donkeys and horses was used to assess the welfare of the animals (Pritchard *et al.*, 2005). Novel tests were used to check the animals' reactions to human approach and handling and several health parameters described the physical condition of the animals (Pritchard *et al.*, 2005). Lesions, wounds, body condition, gait abnormality and other signs of illness or stress like missing teeth, abnormal mucous membranes and diarrhea were parameters included in the protocol (Pritchard *et al.*, 2005). The observation result gives an overview of the animal's situation at the time of the assessment but the parameters were chosen as indicators of problems that have been developed over time (Pritchard *et al.*, 2005). If there is a special area where the prevalence of welfare issues is shown to be high, more detailed parameters can be formulated to detect specific harmful conditions (Pritchard *et al.*, 2005). After the welfare problems have been identified and ranked the next steps in welfare assessment are to do a risk factor analysis and to measure the effect of the targeted resources and management interventions (Pritchard *et al.*, 2005).

EC Regulation No. 882/2004 and related legislation is the framework for how all member states in the European Union should manage their official animal welfare control (Hultgren, 2009). The member states need to prepare a control plan and ensure that the controls are carried out on a risk basis with suitable frequency proportionate on to the estimated risk (Hultgren, 2009). Risk based controls aim to identify control sites where there is a high risk for animal welfare issues and/or non-compliance with relevant legislation and to make use of this information when planning inspections so that control resources can be used efficiently (Hultgren, 2009). The welfare of animals is principally secured by controlling the compliance of relevant legislation, this means that there is need for both animal-based and resource/management-based measures in the control since it is stated in the EC Regulation No. 882/2004 that site-specific information is required in the risk assessment (Hultgren, 2009). The hazards, the central negative events and the consequences are not easy to distinguish in animal welfare and they are often not identified but seen as series of parallel events that contribute to reduced welfare, and most published models for risk assessment have underestimated the complexity of animal welfare (Hultgren, 2009). In Sweden the official animal welfare control has been risk-based to some extent already for a long time and decisions have been made on the basis of information gained at earlier inspections (Hultgren, 2009). A national animal welfare

database has been established with information about all animal owners and site-specific data and there are other registers and databases often administrated by the authorities or the industry with animal welfare-related data from different monitoring schemes that is valuable when establishing risk-based animal welfare control (Hultgren, 2009). Risk management needs adaption to regional or national conditions and the different animal welfare programs from the industry organizations should be developed and used in the risk assessment and management of animal welfare and this requires collaboration between the animal industries and authorities (Hultgren, 2009). Much work is still undone, a national animal welfare risk classification system needs to be designed and important methodological issues need to be solved (Hultgren, 2009). Data from existing databases on welfare status and hazard exposure can be used to compare different inspections strategies and to check assumptions concerning welfare definitions, model structure, categorizations of variables and model parameters (Hultgren, 2009). To promote optimal distribution of control resources and thus improved welfare of the animals, a common view on animal welfare among all different stakeholders is highly desirable (Hultgren, 2009).

DISCUSSION

Results

I am satisfied with the maximum response rate that the questionnaire study yielded and it has given a clear and fair image on how the licensing committees in the Swedish trotting industry experienced their role and work situation at that moment. A majority of the questions were open questions and some categorization of the answers was needed to make the results easier to overview. The committees may have understood the questions and valued factors differently which possibly contributed to the variation in their answers.

There was a large variation, but some common features, in the composition and competence of the committees. The most common procedure for the election of new members in the committees was that the committees themselves, or the sports director/race track manager, proposed a candidate for a position were after the board of the race track approved. It was common that the committees had a given composition with representatives from the race track and different associations like the local horse owner association, trainer association etc. The majority of the committees had undertaken education of some kind organized by the Swedish Trotting association at only one or two occasions. A significant part of the committees had not attended any education events at all. There are no central standards for how new members should be selected and which competence in animal welfare related subjects they need to have to be able to perform audits. As I see it, there is a risk that judgments and auditing routines differ among the committees and that equal audits over the country cannot be guaranteed.

When the committees estimated their own competence in disease control, animal welfare legislation, the horse as a species and individual as well as the durability of horses, on a given scale almost all considered their knowledge as fair or good in all given categories. On the other hand, the committees tended to show some insecurity in animal welfare related subjects since a wish for more education or updating of knowledge was mentioned by a majority of the licensing committees. More contact with other committees and the Swedish Trotting association to standardize the control work were other common requests. A systematic review of several studies showed that physicians self-assessment of their own knowledge had poor accuracy compared with observed measures of competency (Davis *et*

al., 2006), and there is a risk that the committees as well have overestimated their own competence. Academic education in animal welfare related subjects were unusual among the committee members. A few veterinarians, a police, a media journalist and a lawyer were mentioned. The industry experience was very well represented, all committees had at least one or even several members who were or had been active trainers at amateur or professional level. Industry experience is of course useful when performing animal welfare audits, but it is probably not enough in most cases. Animal welfare risks, relevant legislation and recent research findings are probably not discussed enough today at the race tracks or in the committees and I think that future auditors should have a relevant education and knowledge in animal welfare.

The committees described their work as important and they were in general satisfied with their work situation and ability to communicate with the trainers. Preventive routines in the animal welfare work other than the ordinary auditing visits were rare and the committees trusted that other race track staff and trainers had the competence and willingness to report suspected animal welfare issues to the committee. A majority of the committees believed that committees at different racetracks were not unified in their judgments and 39 % of the committees failed to control their trainers within the correct time interval, every year for professional trainers and every fifth year for amateur trainers. This failure should of course not be accepted by the racetracks or the Swedish Trotting Association and my opinion is that resources should be spent on audits as well as on follow-up routines. There is no clear picture of how much the animal welfare control work by the licensing committees cost in total. The information was often incomplete and routines for how the members are compensated probably differ between committees since the presented counts varied and four committees even pointed out that the members were not compensated for the work hours they spent on auditing visits. A more detailed investigation is needed to estimate how much resources an improved animal welfare assurance program will require. It will be challenging to establish an efficient and cost-effective animal welfare assurance program since there are many amateur trainers in the Swedish trotting industry with only one or a few horses each. This means that there are many control sites and travelling between these takes time.

The committees contributed with a lot of useful facts and thoughts that is valuable for this report. A wish for further education and standardization of the control work over the country have been mentioned by a majority of the committees and a new system and course plan for the education of auditors should be developed. A competent auditor should, according to the committees, be experienced in horses and horse racing, have integrity, be able to communicate and have knowledge in relevant legislations and industry regulations. The role of the auditor in a future animal welfare assurance program needs to be considered. Today, a great strength lies in the committees' knowledge about the trainers and the horses in their local control areas and their ability to have a good communication with the trainers. The auditors are probably often well known in the area and to both control and give advice to the trainers about animal welfare is probably not a problem as long as objective controls can be performed. As I see it, the future auditors should be able to perform a strict control with an opportunity to give some basic feedback to the trainers based on the results of the audits. The auditor could inform the trainers where to find more thorough information on how the animal welfare risks could be reduced. The need for feedback to the horse owners based on the outcome of the control results has also been discussed in the ongoing research project on an equine welfare monitoring system based on

the Welfare Quality framework (S. Viksten, Swedish University of Agricultural Sciences, personal comm. 2012-05-08). The ambition for the future is to test different feedback systems that can provide the horse owners with relevant and correct information on how to improve the animal welfare (S. Viksten, Swedish University of Agricultural Sciences, personal comm. 2012-05-08). An effective animal welfare assurance program should aim to prevent animal welfare problems by pointing out the specific risks at every facility, and the trainers could accomplish positive effects, like healthier and better performing horses in a safe stable environment, by following the standards of the program.

The committees had different routines when veterinary expertise was needed and it would probably be beneficial to have a specific veterinarian to consult when questions about animal health or disease control arise in the preventive animal welfare work and this matter needs to be discussed when planning a future animal welfare assurance program. The relationship with the County Administrative Board varied between committees and a more regular and preventive contact could be useful for both parts. A standardized and revised animal welfare assurance program in the trotting industry could be used in the risk assessment of the official control while the trainers could be favored by a longer control interval in the official animal welfare control. It is also important that the industry's auditors know where to turn to when severe animal welfare issues are found. There could also be reasons to contact the environmental inspector from the municipality in some errands or even the police if acute situations arise. It would be beneficial with routine contact between the auditors and the local authorities so that the reporting and handling of cases could be done effectively.

Assessment of risks in the industry's own control has also been requested by several committees and there was a wish for a risk-based system for estimation of control intervals in general and specifically a shorter control interval for amateur trainers than the current interval of five years. Risk based controls aim to identify control sites where there is a high risk for animal welfare issues and/or non-compliance so that control resources can be used efficiently (Hultgren, 2009) and some kind of grading and classification system for the outcome of the control results will probably be needed to decide a suitable control interval for every trainer. Other factors like reports from the Administrative County Board, the official racing veterinarian or other race day staff should also affect the control interval. Some committees pointed out the fact that minor deviations from the legislation can be accepted if the welfare of the animals is not compromised but how should these deviations be valued? Would the Administrative County Board do the same judgment as the industry's own auditors? Could maybe minor deviations always be accepted by the official animal welfare control if the trainer is controlled and approved by a high quality animal welfare assurance program? This is already done in the Swedish poultry meat- and egg industry today where approved breeders get to apply special legislation in form of higher stocking density.

An interesting question that one committee pointed out was whether the audits should be announced or unannounced. The official animal welfare control visits performed by the County Administrative Board are generally unannounced as demanded in the EC Regulation No. 882/2004. Unannounced audits might be hard to perform in the trotting industry, especially of amateur trainers who will probably be away from their stables during daytime. The value of inspection results depends on the type of operation, the skills of the inspector, the contact between inspector and animal owner and the extent to which

the inspection has been foreseen (Hultgren, 2009). Official animal welfare inspections should be carried out without prior notification; however a general announcement that animal welfare inspections are to take place can be beneficial (Cassidy, 2009). The authorities responsible for the official animal welfare control in the Netherlands made a general announcement to a certain group of farmers that they were likely to be inspected and the authorities could see that farmers had made adjustments prior to inspections taking place and it is likely that a higher level of compliance were achieved also on farms that did not get an inspection since there was a good possibility that they had made similar efforts (Cassidy, 2009). Animal care committees controlling the welfare of research animals reported both advantages and disadvantages of unannounced inspections (DeHaven, 2002). Unannounced inspections can give the most accurate picture of the conditions in a facility on a day-to-day basis while other committees reported that the method is counterproductive since people whom they need to communicate with are not always present and the unannounced inspection does not always promote positive, constructive communication with the researcher and other staff (DeHaven, 2002). Alternating announced inspections with unannounced inspections can reap the benefits of both systems (DeHaven, 2002). Hartvigsson (2009) also reported that animal owners tended to be more satisfied with the communication if the official animal welfare inspection was announced in advance and that there is a risk that a lot of resources are spent on extra time for travelling if the animal owners are unavailable at unannounced inspections. Hartvigsson (2009) questioned the use of unannounced inspections since severe animal welfare issues cannot be hidden by the animal owner if the inspection is announced with short notice. Future research on the effect of unannounced versus announced control visits could provide us with answers on how preventive animal welfare work best could be performed. The need for unannounced inspections probably differs a lot between different activities and the advantages and disadvantages of unannounced audits in the trotting industry can be discussed. The licensing committees that I followed during my study visits chose to perform unannounced audits of professional trainers since they were likely to be available and announced audits of amateur trainers because of the obvious risk that they would be away from their stables during daytime. Doping tests and visits carried out as a result of reporting of suspected poor horse management should preferably not be announced in advance.

Much of the preventive animal welfare work can be done by controlling the appropriateness of future trainers at the licensing courses. A close contact between the auditors and the educators at the courses is beneficial since they have opportunity to reach out to new trainers. There is also a possibility to check if new trainers have had previous problems in their animal management by contacting the County Administrative Board. One committee pointed out the need for education of older trainers who got their licenses before the mandatory licensing courses were introduced. The same committee had also experienced that trainers who already had gone through the mandatory course had requested some further education or just a refreshment of their knowledge and there should be courses available for active trainers too. Johansson (2011) reported that Swedish amateur- and professional trainers often had poor knowledge about the biology of the horse and animal welfare legislation and they seemed to have overconfidence in their knowledge about animal welfare. Johansson (2011) concluded that the trainers needed both basic- and further education in animal welfare and the biology and ethology of the horse. Inappropriate training and racing can cause health issues (Evans, 2002) and poor knowledge about natural behavior and learning theory leads to reduced welfare (Waran *et al.*, 2002). It is hard, if not impossible, to strictly control the attitude and knowledge of

trainers during ordinary audits. Changes in human attitude and increasing of knowledge about equine welfare are best achieved by educating trainers and other people handling horses. I think that the licensing courses need to contain a significant share of natural equine behavior, animal welfare and animal ethics. This concept needs to be a part of all work done at all levels, both at the central organization, at the race tracks and in every stable. Information meetings for both race track staff and trainers could be performed regularly and continuously updated information about animal welfare, relevant legislation and disease control needs to be easily available for all parts in the industry as a preventive routine. New experiences and research findings needs to be distributed and implemented in the whole trotting industry. What one learned at the licensing course ten years ago may not be relevant today.

The fact that not all trotters are controlled by the licensing committees today since no regular audits at stud farms are performed was also mentioned in the answers of the questionnaire and this could maybe be an issue for the breeding department at the Swedish Trotting Association and the breeders associations to discuss for the future. Not only breeding stock can be out of reach, racehorses of today travel a lot and some trainers keep their horses at several yards in different regions and contact between different local auditors is therefore essential to make sure that all horses are controlled. Some Swedish trainers even keep a number of horses abroad and foreign trainers keep horses in Sweden for longer periods as one committee pointed out. Checking the official list of horses in training and how the trainer have solved the daily care of horses stabled at different yards in Sweden or abroad is therefore important to make sure that all horses are cared for.

The committees were mainly satisfied with the protocol and the reporting but there is room for improvements on both the protocol and on how web based tools could be extended and used for both distribution of information and reporting of auditing results. A new extended web based tool for reporting of auditing results and results from race day controls can provide the industry with valuable data on the welfare and health of the horses. The industry's animal welfare audits are done to check compliance with both own regulations of the association and relevant legislation. There are several animal welfare issues typical for the horse racing industry (Mundy, 2000) making horse racing an often debated subject and it is important to remember that there also are demands of the general public. There is a need for clear follow-up routines when shortcomings are found at the audits and the control points in the protocol needs to be updated. Health risks specific for the racehorse in general, not only Standardbreds, were quite well described in the literature. There was also scientific information available concerning the behavioral needs of the horse. The largest gap in research, as I experienced it, was the horse's stable environment including conformation of buildings, stalls and fences. I agree with von Wachenfelt *et al.* (2011) who claimed that the paragraphs in the regulations (DFS 2007:6) which regulate the size and formation of horse stalls, often are based on experience, not scientific studies. I request future studies and statistics based on veterinary data which can identify the welfare risks in the horse's environment. The effect of early racing on young trotters have not been much described in the literature so far and the industry's own data and future scientific studies on how the health, performance and welfare of Standardbred- and coldblooded trotters are affected could provide us with more information in this debated question. Studies performed under Scandinavian conditions would be particularly interesting since training- and racing routines as well as medication regulations differ over the world.

More animal-based measures should be used in the future protocol with focus on body condition, signs of injury, hooves and natural behavior. The whole horse, including the mouth, should be examined. The auditor should when possible spend some time to watch the horses and their behavior in general. Animal-based welfare measures have not yet been described to a large extent in the literature and hopefully it will be easier to find guidelines on how to use them on horses when the results from the Welfare Quality project are presented. S. Viksten at the Swedish University of Agricultural Sciences (personal comm. 2012-05-08) concluded that one part of the Welfare Quality project is to figure out how the measurements best could be used and ideas on how to educate people on how to use the protocol and apply the measurements are being discussed. Other control points that need to be updated concerns medication- and disease control routines as well as important documentation. Random doping tests should be performed on horses in training at some auditing visits. See appendix 3 for a complete proposal on new control points.

A future animal welfare assurance program

The animal welfare audits of the Swedish Trotting Association are not revised or quality checked today. The control points do not cover all relevant areas of the management and care of racehorses and there are no clear guidelines on competence requirement of the auditors or supervisory control of the performance of audits and reporting of results.

Several factors need to be considered when establishing a revised animal welfare assurance program. It is essential that the auditors have education and experience in both animal welfare and horse management. Good knowledge about the control area and the trainers is valuable but on the other hand there should be no risk of conflict of interest and the judgments should be objective and secure. The local licensing committees grant and suspend trainer licenses and the auditors need to have a good contact with the licensing committees also in the future. The licensing committees can provide the auditors with valuable information about the local areas and their trainers. One alternative is that the Swedish Trotting Association will be responsible for consulting and educating auditors that will perform the animal welfare audits alone or together with a special contact person from the local licensing committee. These future auditors could preferably work in specific regions including a number of race tracks. The results from the auditing visits should be reported to the trainer, the local licensing committee, the Swedish Trotting Association and the local County Administrative Board. All information about animal welfare and disease control as well as audit results could be shared among the local auditors, the responsible persons at the race tracks and the Swedish trotting association through a web based data system. This animal welfare assurance program could preferably be revised by a third party control consulted by the Swedish Trotting Association to make sure that the audits, the follow-up routines and the reporting are performed correctly. The ambition of the Swedish Trotting Association is to develop an animal welfare assurance program which may be approved by the Swedish Board of Agriculture (G. Åkerström, Swedish Trotting Association, pers. comm. 2012-03-22) and there needs to be a continuous contact between the Swedish Trotting Association and the Swedish Board of Agriculture during the process to decide on the conditions for the program and how the revision of the program will be carried out by the Swedish Board of Agriculture. Important to remember is that an animal welfare assurance program needs to be revised and updated when relevant new experience and research findings are presented to always meet the current demands. Resources needs to be spent on preventive animal welfare work if the trotting industry wants to secure that

the horses are cared for with knowledge, love and respect as stated in the basic values of the Swedish Trotting Association.

CONCLUSIONS

The licensing committees often experienced that they were not offered enough education in animal welfare with relevant legislation and disease control as the most mentioned gaps of knowledge. A majority of the committees believed that the committees over the country were not unified in their judgments and they felt a need for more active support from the Swedish Trotting Association. 39 % of the committees failed to control their trainers within the correct time interval. There is room for improvements in the trotting industry's animal welfare control. The individuals who perform the audits and evaluate the animal management need to be well educated and updated on animal welfare standards and legislation. The animal welfare control work needs to be standardized over the country and the auditors need continuous education and updating. The web based tools could be extended and used for both distribution of information and reporting of auditing results. The interval for auditing visits for every trainer should be risk-based.

Racehorses are exposed to welfare hazards both in their management as well as during training and racing. General control points concerning housing conditions, feeding routines and disease control are not enough to cover all possible welfare hazards. Training routines, training tracks, signs of injury, hooves and body condition, medication routines and equipment are important factors that need to be checked. The Swedish trotting Association should take a larger responsibility both in the education of auditors and in the financing of the industry's animal welfare assurance program. There is a need for well-educated auditors with good knowledge in animal welfare and own experience from the horse industry and knowledge about the control region are beneficial. The protocol needs to be revised and all reporting and access of information could be done in an extended version of the current data system. The auditors would function as a second-party control through their audits of the trainers and their horse management. The auditors could preferably work in specific regions with close contact to the licensing committees and their work should be revised by a third party control. The official animal welfare control would be performed by the County Administrative Board.

ACKNOWLEDGEMENTS

I would like to thank my supervisors Jenny Yngvesson and Göran Åkerström for their support and encouragement. I am also grateful for all the help I received from the racetracks and their licensing committees that made this project possible. A special thank you goes to Percy Romberg, Mats Persson, Marie Lundin, Monica Hellstaf and Claes Björck for letting me follow them in their work during my study visits.

REFERENCES

Airaksinen, S., Heinonen-Tanski, H., Heiskanen, M-L. 2001. Quality of different bedding materials and their influence on the compostability of horse manure. *Journal of Equine Veterinary Science*. 21, 125-130.

Airaksinen, S. 2006. Bedding and manure management in horse stables – its effect on stable air quality, paddock hygiene and the compostability and utilization of manure. Doctoral dissertation, Kuopio University, Finland. Kuopio University Publications C. Natural and Environmental Sciences. 190, 1-52.

Algers, B., Strömberg, S. 1973. Buller i djurmiljöer. Veterinärhögskolans institution för husdjurshygien, Skara, Sweden.

Animal Welfare Act, 1988:534.

Arthur, R.M. 2011. Welfare issues in horse racing. In: *Equine Welfare* (Ed. McIlwraith, C.W. & Rollin, B.E.).

Bachmann, I., Audigé, L., Stauffacher, M. 2003. Risk factors associated with behavioural disorders of crib-biting, weaving and box-walking in Swiss horses. *Equine Veterinary Journal*. 35, 158-163.

Barchiesi, A., Lindkvist-Ottow, E., Loberg, J., Palmqvist, G. 2008. Ett djurskydd i förändring - genom tillämpning av djuromsorgsprogram, likvärdiga och riskbaserade kontroller samt en utvecklad förprovning. Report 2008:24. Swedish Board of Agriculture, Jönköping.

Blokhuis, H.J., Veissier, I., Miele, M., Jones, B. 2010. The Welfare Quality® project and beyond: Safeguarding farm animal well-being. *Acta Agriculturae Scandinavica, Section A - Animal Science*. 60, 129-140.

Casey, R.A. 2002. Clinical problems associated with the intensive management of performance horses. In: *The welfare of horses* (Ed. N. Waran). Dordrecht, Kluwer Academic Publishers.

Cassidy, T. 2009. Monitoring animal welfare. In: *Food safety and assurance and veterinary public health vol. 5, Welfare of production animals: assessment and management of risks* (Ed. F.J.M. Smulders & B. Algers). Wageningen, Wageningen Academic Publishers.

Chateau, H., Holden, L., Robin, D., Falala, S., Pourcelot, P., Estoup, P., Denoix, J.M., Crevier-Denoix, N. 2010. Biomechanical analysis of hoof landing and stride parameters in harness trotter horses running on different tracks of a sand beach (from wet to dry) and on an asphalt road. *Equine Veterinary Journal*. 42 Suppl., 488-495.

Chateau, H., Robin, D., Falala, S., Pourcelot, P., Valette, J.-P., Ravary, B., Denoix, J.-M., Crevier-Denoix, N. 2009. Effects of a synthetic all-weather waxed track versus a crushed sand track on 3D acceleration of the front hoof in three horses trotting at high speed. *Equine Veterinary Journal*. 41, 247-251.

- Collinder, E., Lindholm, A., Rasmuson, M. 1997. Genetic markers in Standardbred trotters susceptible to the rhabdomyolysis syndrome. *Equine Veterinary Journal*. 29, 117-120.
- Crevier-Denoix, N., Pourcelot, P., Ravary, B., Robin, D., Falala, S., Uzel, S., Grison, A-C., Valette, J.-P., Denoix, J.-M., Chateau, H. Influence of track surface on the equine superficial digital flexor tendon loading in two horses at high speed trot. 2009. *Equine Veterinary Journal*. 41, 257-261.
- Cserhalmi, N. 2004. *Djuromsorg och djurmisshandel 1860-1925*. Möklinta. Gidlunds.
- Curtis, L., Raymond, S., Clarke, A. 1996. Dust and ammonia in horse stalls with different ventilation rates and bedding. *Aerobiologia*. 12, 239-247.
- David, T. 2008. Report on NSAIDs and corticosteroids as they relate to pre-race inspections. Report of the ARCI Regulatory Veterinarian Committee to the racing medication and testing consortium. Available at: http://rmtcnet.com/resources/NSAID_IA_Cort_Statement.pdf. Accessed March 13, 2012.
- Davidson, N., Harris, P. 2002. Nutrition and welfare. In: *The welfare of horses* (Ed. N. Waran). Dordrecht, Kluwer Academic Publishers.
- Davis, A.D., Mazmanian, P.E., Fordis, M., Van Harrison, R., Thorpe, K.E., Perrier, L. 2006. Accuracy of physician self-assessment compared with observed measures of competence - a systematic review. *Journal of the American Medical Association*. 296, 1094-1102.
- DeHaven, W.R. 2002. Best practices for animal care committees and animal use oversight. *ILAR Journal*. 43 Suppl., 59-62.
- El Shorafa, W. M., Feaster, J. P., Ott, E. A., Asquith, R. L. 1979. Effect of vitamin D and sunlight on growth and bone development of young ponies. *Journal of Animal Science*. 48, 882-886.
- Emanuelsson, R. 2009. *Räddningsinsatser i lantbruksmiljö*. Report 2009:17. Faculty of Landscape Planning, Horticulture and Agricultural Sciences, Swedish University of Agricultural Sciences, Alnarp.
- Endenburg, N. 1999. Preceptions and attitudes toward horses in european societies. *Equine Veterinary Journal*. 31, 38-41.
- Evans, D. L., Walsh, J.S. 1997. Effect of increasing the banking of a racetrack on the occurrence of injury and lameness in Standardbred horses. *Australian Veterinary Journal*. 75, 751-752.
- Evans, D.L. 2002. Welfare of the racehorse during exercise training and racing. In: *The welfare of horses* (Ed. N. Waran). Dordrecht, Kluwer Academic Publishers.
- Farm Animal Welfare Council. 2011. The five freedoms. Available at: <http://www.fawc.org.uk/freedoms.htm>. Accessed October 17, 2011.

- Federation of Swedish farmers. 2009. Hästhusesyn – praktisk guide för lagar och krav. Federation of Swedish farmers, Stockholm.
- Frape, D. 2010a. Vitamin and water requirement. In: Equine nutrition and feeding. Oxford, Wiley-Blackwell.
- Frape, D. 2010b. Grassland and pasture management. In: Equine nutrition and feeding. Oxford, Wiley-Blackwell.
- Goodwin, D. 1999. The importance of ethology in understanding the behaviour of the horse. *Equine Veterinary Journal*. 31, 15-19.
- Hartman, E., Winter Christensen, J., Keeling, L.J. 2009. Social interactions of unfamiliar horses during paired encounters: Effects of pre-exposure on aggression level and so risk of injury. *Applied Animal Behaviour Science*. 121, 214-221.
- Hartvigsson, M. 2009. Communication between animal welfare inspectors and animal owners. Student report, Swedish University of Agricultural Sciences, Skara.
- Holcombe, S.J., Jackson, C., Gerber, V., Jefcoat, A., Berney, C., Eberhardt, S., Robinson, N.E. 2001. Stabling is associated with airway inflammation in young horses. *Equine Veterinary Journal*. 33, 244-249.
- Hultgren, J. 2009. Animal welfare risk assessment and management from a national perspective. In: Food safety and assurance and veterinary public health vol. 5, Welfare of production animals: assessment and management of risks (Ed. F.J.M. Smulders & B. Algers). Wageningen, Wageningen Academic Publishers.
- Hunter, L., Houpt, K.A. 1989. Bedding material preferences of ponies. *Journal of Animal Science*. 67, 1986-1991.
- Johansson, S. 2011. What's there to know? - A questionnaire of the relationship between knowledge of animal welfare and the biology of the horse and animal welfare related misdemeanors in Swedish harness racing. Student report, Swedish University of Agricultural Sciences, Skara.
- Knight, P.K., Evans, D.L. 2000. Clinical abnormalities detected in post-race examinations of poorly performing Standardbreds. *Australian Veterinary Journal*. 78, 344-346.
- Knight, P.K., Thomson, P.C. 2011. Age at first start and racing career of a cohort of Australia Standardbred horses. *Australian Veterinary Journal*. 89, 325-330.
- Knubben, J.M., Fürst, A., Gygax, L., Stauffacher, M. 2008. Bite and kick injuries in horses: Prevalence, risk factors and prevention. *Equine Veterinary Journal*. 40, 219-223.
- Law on the prevention of accidents, 2003:778.
- Mason, G. J. 1991. Stereotypies: a critical review. *Animal Behaviour*. 41, 1015-1037.

- McGorum, B.C., Ellison, J., Cullen, R.T. 1998. Total and respirable airborne dust endotoxin concentrations in three equine management systems. *Equine Veterinary Journal*. 30, 430-434.
- McGreevy, P. 2004. Introduction. In: *Equine Behavior*. Saunders/Elsevier.
- McGreevy, P.D., McLean, A.N. 2009. Punishment in horse-training and the concept of ethical equitation. *Journal of Veterinary Behavior*. 4, 193-197.
- McKenzie, E.C., Valberg, S.J., Godden, S.M., Pagan, J.D., MacLeay, J.M., Geor, R.J., Carlson, G.P. 2003. Effect of dietary starch, fat, and bicarbonate content on exercise responses and serum creatine kinase activity in Equine Recurrent Exertional Rhabdomyolysis. *Journal of Veterinary Internal Medicine*. 17, 693-701.
- McLean, A. N. 2005. The positive aspects of correct negative reinforcement. *Anthrozoös*. 18, 245-254.
- Mills, D.S., Clarke, A. 2002. Housing, management and welfare. In: *The welfare of horses* (Ed. N. Waran). Dordrecht, Kluwer Academic Publishers.
- Ministry for Rural Affairs. 2009. Översyn av djurskyddslagstiftningens utformning och innehåll. Dir 2009:57. Ministry for Rural Affairs, Stockholm, Sweden.
- Ministry for Rural Affairs. 2011. Ny djurskyddslag - Betänkande av utredaren i Översyn av djurskyddslagstiftningens utformning och innehåll. SOU 2011:75. Ministry for Rural Affairs, Stockholm, Sweden.
- Mossberg, I., Andersson, M. 1981. Ljusets betydelse i animalieproduktionen. Report 82, 2-19. Swedish University of Agricultural Sciences, Uppsala.
- Mundy, G.D. 2000. Equine Welfare: Racing. *Journal of the American Veterinary Medical Association*. 216, 1243-1246.
- Nagy, P., Guillaume, D., Daels, P. 2000. Seasonality in mares. *Animal Reproduction Science*. 60-61, 245-262.
- Ninomiya, S., Aoyama, M., Ujiie, Y., Kusunose, R., Kuwano, A. 2008. Effects of bedding material on the lying behavior in stabled horses. *Journal of Equine Science*. 19, 53-56.
- Nyman, S., Dahlborn, K. 2001. Effect of water supply method and flow rate on drinking behavior and fluid balance in horses. *Physiology & Behavior*. 73, 1-8.
- O'Grady, S.E. 2008. Basic farriery for the performance horse. *Veterinary Clinics of North America: Equine Practice*. 24, 203-218.
- Pagan, J. D. 2009. Forages: The Foundation for Equine Gastrointestinal Health. In: *Advances in Equine Nutrition IV* (Ed. J.D. Pagan). Nottingham. Nottingham University Press.

Pritchard, J.C., Lindberg, A.C., Main, D.C.J., Whay, H.R. 2005. Assessment of the welfare of working horses, mules and donkeys, using health and behaviour parameters. *Preventive Veterinary Medicine*. 69, 265-283.

Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules.

Siby, M. 2011. What affects trotter horses durability - A study with focus on the animal welfare aspects of current training and treatment routines of Swedish trotting trainers. Student report, Swedish University of Agricultural Sciences, Skara.

Stout, W.L., Fales, S.L., Muller, L.D., Schnabel, R.R., Weaver, S.R. 2000. Water quality implications of nitrate leaching from intensively grazed pasture swards in the northeast U.S. *Agriculture, Ecosystems & Environment*. 77, 203-210.

Swedish Animal Welfare Agency's administrative provisions and guidelines (DFS 2007:6) on the keeping of horses, ref L101.

Swedish Trotting Association. 2010a. Älskade travsport – Värden som får passion att växa och utvecklas. Swedish Trotting Association, Stockholm.

Swedish Trotting Association. 2010b. Arbetsinstruktion för lokal licenskommitté. Swedish Trotting Association, Stockholm.

Townsend, H.G.G. 2003. Equine Influenza. In: *Current Therapy in Equine Medicine* (Ed. N.E. Robinson). Missouri, Saunders.

Uusi-Kämppä, J., Hyvärinen, M., Kuisma, M., Nykänen, A., Jansson, H., Jansson, H., Närvänen, A. 2007. Faecal microorganisms in runoff from cattle and horse farms - quantification and mitigation. *International Congress in Animal hygiene, ISAH*, Tartu, Estonia. *Proceedings*, vol. 1, 909- 914.

Vigre, H., Chriél, M., Hesselholt, M., Falk-Rønne, J., Kjær Ersbøll, A. 2002. Risk factors for the hazard of lameness in Danish standardbred trotters. *Preventive Veterinary Medicine*. 56, 105-117.

von Wachenfelt, H., Nilsson, C., Ventorp, M. 2011. Safe horse stables – kick loads from horses on fittings and building constructions. Report 2011:20. Department of Rural Buildings and Animal Husbandry, Swedish University of Agricultural Sciences, Alnarp.

Waran, N., McGreevy, P., Casey, R.A. 2002. Training methods and horse welfare. In: *The welfare of horses* (Ed. N. Waran). Dordrecht, Kluwer Academic Publishers.

Warren-Smith, A. K., McGreevy, P.D. 2008. Equestrian coaches' understanding and application of learning theory in horse training. *Anthrozoös*. 2, 153-162.

Wiepkema, P.R., Koolhaas, J.M. 1993. Stress and animal welfare. *Animal Welfare*. 2, 195-218.

APPENDICES

Appendix 1 - Control points used by the licensing committees today

Basic facts

Date, track, trainer/horse owner, license, address, description of property, county, phone numbers, e-mail address, name of the auditor, representative from the stable at the time for the control visit, number of stables/box stalls/horses, deviations from the official list of horses in training.

Stable

Stable climate

Windows and lighting

Noise

Bedding

Feedstuff and water

Cleaning

Ceiling height and other measurements

Harness room

The general condition of the horses

Body condition

Hoof care

Management/care

Pastures/paddocks/shelter

Fencing

Ground/surface

Shelter

Other

Manure management

Medicine management

Equipment/carts

Permission according to § 16 of the Animal Welfare Act

Appendix 2 – The committees’ answer to question 28 in the questionnaire

28. Other comments, thoughts or tips?

The committees shared their thoughts and tips generously. The answers have been divided into four categories; Education, Audits, Documentation and Other. The number in the parentheses shows how many committees that shared the specific opinion.

Education

The committee needs to be more educated/updated in animal welfare (13). The committee wishes to have more contact with other committees for discussion and standardization (8). Video conferences could be used in our education (1). Education meetings could be held in regional groups (1). We are not experienced enough today to perform good auditing visits (1). There should be clear guidelines on how to perform auditing visits (1). The licensing course educators get continuous education, why are there no education meetings for the committees? (1).

Audits

The interval for auditing visits should be risk-based (4). Performing audits takes time and resources (3). Amateur trainers should be visited more often than every fifth year (3). We should have more collaboration with the County Administrative Board (2) and our controls should be standardized (1). There are no follow-up controls today on whether the committees have performed enough auditing visits or not (2). Only licensed trainers are audited today and a lot of horses are therefor out of our reach (1). Standardbred breeders could need to get auditing visits too (1). Background checks of new trainers (1) and of foreign trainers moving their license to Sweden (1) could be useful in the preventive animal welfare work. The geographic borders for the control areas should be clear so that all trainers are visited (1). Do other committees perform announced or unannounced audits? (1). Fire protection routines needs to be checked (1). Breath alcohol concentration tests should also be performed in training (1). The Swedish Trotting Association should have higher demands on the stable environment than required in the animal welfare legislation (1). New trainers should get their first auditing visit as soon as possible (1). The audits should always be objective (1). How should minor deviations be valued? (1). Minor deviations could be accepted if the welfare of the horses is not compromised (1). The season affects the audits since some control points could be harder to control at certain weather conditions (1). A central coordinator should regularly perform auditing visits together with the local committees (1).

Documentation

Permission according to the 16th paragraph of the Animal Welfare Act should be checked (2). Transportation permissions should be checked (2) and the educators at the transportation courses should report to the committee which trainers that have attended their courses (1). Photo documentation could be useful in the control work (1). The protocol should be easy to overview (1). There should be more internet based tools where useful information could be stored and shared and where the committees could keep in contact. Results from the audits should be shared between committees so that trainers that move their license from another track could easily be checked up (1).

Other

It is positive that our work is investigated (1) and we need to update our animal welfare work in the presence of the upcoming new Animal Welfare Act (1). We need to consider the demands of the general public (1) and the trotting industry should be a role model in the horse industry (1). The Swedish Trotting Association should focus more on animal welfare (1). It is important that every race track takes its responsibility in the animal welfare work (1). It is important that resources are spent locally and not only in the central organization (1). We should take care of the active trainers and try to keep their expenses from increasing (1). How could we reach out to older trainers with poor knowledge in animal welfare? (1). It is valuable to have the licensing course educator in the committee who meets new trainers already at the trainer education and is able to quickly estimate their appropriateness as horse owners (1). Other horse industry organizations should be represented in the local epizooty committee since there often are different types of horses at one training facility and the quarantine restrictions should be followed by all horse owners and trainers (1). The animal welfare audits should function as a quality assurance of the horses' environment so that horse owners know that the horses are kept under good conditions (1).

Appendix 3 - Proposal on new control points

Basic facts

Date, weather condition, track, trainer/horse owner, license, address, description of property, GPS-coordinates, county, phone numbers, e-mail address, name of the auditor, representative from the stable at the time for the control visit, number of stables/box stalls/horses, deviations from the official list of horses in training.

Stable

Stable climate and light; air quality, ventilation system, noise, lighting, windows.

Size and formation of box stalls and the stable as a whole. Safety risks for the horses.

Quality of water, feedstuff and bedding materials. Feeding routines. Water supply.

Cleaning, both daily and yearly routines.

Harness room and equipment.

Storing of medicines.

Outdoor areas

Fencing.

Condition/character of the ground in paddocks and pastures.

Weather shelter and laying areas if kept in outdoor systems.

Condition/character of training tracks.

Horse-based parameters

Body condition.

Hooves and shoeing.

Cleanness, lesions, lameness.

Possibility to express natural behavior; social contact, eating time, daily free exercise outdoors, signs of behavioral problems.

Management and care

Daily care of all horses.

Daily turn-out of all horses.

Daily checks of automatic systems.

Enough staff with sufficient knowledge.

Training schedules.

Possibility to extra care of sick or injured horses.

Disease control, quarantine, medication routines, injections, operations.

Fire protection and backup plan for power outages.

Manure management.

Documentation

Journals and health records.

Passports.

Permission according to § 16 of the Animal Welfare Act.

Transportation permission for commercial use.

Extra

Doping test.

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