


Research Article

Evaluation of Online Training to Improve Animal Welfare of Cattle during Transport and Slaughter from the Perspective of Animal Welfare officers and official Veterinarians

Svea Nicolaisen*, Christa Thöne-Reineke, Mechthild Wiegard

Abstract

Animal welfare during transport and slaughter is a major concern for the European livestock industry. Despite existing legislation and guidelines, it remains challenging to achieve optimal animal welfare standards during these processes. The aim of this study was to evaluate the implementation and effectiveness of two multilingual online animal welfare training modules designed for less educated slaughterhouse work hands and livestock transport drivers. The training modules focused separately on animal behavior and cattle handling, with an emphasis on visual teaching materials such as pictures and videos. An online survey was conducted, in which 25 official veterinarians and animal welfare officers participated, who evaluated the two training modules. The survey included questions on design, ease of use, comprehensibility, and learning content. Participants rated the modules positively, with the majority awarding very good or good ratings for the design, layout, content, structure, and usability of the videos and interactive elements. Results also indicated that the modules provided comprehensive information and were appropriate in terms of scope and completion time. Participants expressed satisfaction with the content and agreed to use the training program themselves for teaching purposes. Feedback from the open questions indicated the strengths and areas for improvement of the modules. This study contributes to the improvement of online training materials to promote animal welfare. By providing slaughterhouse and livestock transport employees with the necessary knowledge and skills, this training program has the potential to improve animal welfare practices, reduce stress levels for workers and animals, and improve the overall work environment. Further research and development of targeted online training modules should be encouraged to improve animal welfare standards during transport and slaughter.

Keywords: Animal welfare; Evaluation; E-learning; Abattoir; Transport; Animal welfare officers

Introduction

Animal welfare during transport and slaughter is an important concern in the European livestock industry, reflecting societal values and ethical considerations [1]. Animal welfare in this process has become an increasing focus and has led to efforts to improve standards and practices in Europe. European Union (EU) member states have extensive livestock industries, with millions of animals slaughtered annually [2]. Ensuring the welfare of

Affiliation:

Institute of Animal Welfare, Animal Behavior and Laboratory Animal Science, School of Veterinary Medicine, Freie Universität Berlin, 14163 Berlin, Germany

*Corresponding author:

Svea Nicolaisen, Institute of Animal Welfare, Animal Behavior and Laboratory Animal Science, School of Veterinary Medicine, Freie Universität Berlin, 14163 Berlin, Germany

Citation: Svea Nicolaisen, Christa Thöne-Reineke, Mechthild Wiegard. Evaluation of Online Training to Improve Animal Welfare of Cattle During Transport and Slaughter from the Perspective of Animal Welfare officers and official Veterinarians. *Journal of Food Science and Nutrition Research*. 6 (2023): 85-101.

Received: July 11, 2023

Accepted: July 19, 2023

Published: August 22, 2023

these animals during transport and slaughter is important for ethical and moral reasons [3]. However, despite existing animal welfare legislation and guidelines, there are still challenges in achieving optimal animal welfare standards during transport and slaughter. Problems include inadequate handling practices, poor facilities, and overcrowding that can lead to stress, fear, and physical harm to animals [4]. Addressing these challenges requires a multi-faceted approach to reduce potential animal welfare problems. Slaughterhouse work hands and livestock transport drivers have direct contact with animals, so their knowledge and experience are critical to animal welfare. Appropriate training programs can equip these individuals with the necessary skills and understanding of animal behavior, signs of stress, and appropriate handling when interacting with animals [5]. Through comprehensive training, employees can identify, prevent, and avoid potential violations of animal welfare best practice and laws. Stunning and slaughtering of animals should only be done by persons with a certified competence (Art. 21 of Regulation No. 1099/2009) [6]. Companies that slaughter more than 1,000 large animals per year must appoint an animal welfare officer to monitor animal welfare compliance during handling, stunning, and slaughter. In addition, standard operating procedures for the handling of animals must be established, and compliance must be monitored by animal welfare officers (Art. 17 of Regulation (EC) No 1099/2009) [6]. Research has demonstrated the positive impact of training programs on animal welfare in slaughterhouses. For example, studies have shown that well-trained personnel demonstrate great sensitivity to animal welfare, resulting in low stress levels for workers and animals, improved handling techniques, and more efficient processes [7,8]. Training programs not only improve animal well-being, but also contribute to a positive work environment that prioritizes animal welfare. The aims of the present study were to test the conception and implementation of two animal welfare training modules and to have them evaluated by experts. This study was carried out as part of the joint research project eSchulTS² (development of target group-specific learning modules to improve animal welfare during transport and slaughter of cattle and pigs). The study is intended to contribute to the improvement of online training modules for slaughterhouse work hands with differing language skills and cultural/sociological backgrounds, and who work directly with live animals during livestock transport or at slaughterhouses. Content of the modules was developed on the basis of a Delphi survey on topics that are relevant to animal welfare and that can be trained. Only the learning materials considered most important were implemented within the framework of this project. At the end of the eSchulTS² project, the online training modules will be made available to all interested stakeholders free of charge.

Materials and Methods

Design of the online training modules

The online training modules were targeted at slaughterhouse employees and livestock transport drivers, and were made available on the online platform tet.folio [9] via any internet-enabled computer, laptop or tablet. The experts in our study (i.e., participants) had access to two pilot modules, animal behavior and cattle handling. The participants could select a language (Romanian or German) on the start page and could choose to listen to the texts by clicking on a loudspeaker icon. The modules were deliberately designed with a minimum of text and consisted mainly of images and video material to ensure easy comprehensibility. The photo and video materials used in the modules were captured by the eSchulTS²-Team during livestock handling processes in German slaughterhouses. In addition, the two modules contained selectable information fields in which further content, such as the legal basis of the topic area, was provided. The time required to complete one module (below called processing time) was designed by us to be a maximum of 15 minutes. The two modules could be revisited at any time. At the end of both modules, there was a quiz on the respective topics in order to check participant's understanding.

Layout and distribution of the survey

The survey "Evaluation of online training modules for slaughterhouse staff and animal transporters" was designed and developed by employees of the Institute of Animal Welfare together with participants in the joint research project, eSchulTS². The questionnaire tool Limesurvey [10] was used to create the survey. There were three groups of survey questions: questions to collect demographic data about the participants; questions on the animal behavior module and; questions on the cattle handling module. For the processing of personal data, ethical approval was obtained in advance from the Central Ethics Committee of Freie Universität Berlin for the study (CEC-No. 2023-001). The survey (Supplementary Material 1) was conducted anonymously and consisted of 19 questions, 6 of which were mandatory. In the survey, besides open (free text answer) questions and single-answer questions, most questions were evaluation questions. The answers to the evaluation questions were assigned to two groups using a six-point Likert scale: 1 (very good), 2 (good), and 3 (satisfactory) representing a positive rating or agreement, and 4 (sufficient), 5 (poor), and 6 (inadequate) representing a negative rating. The survey evaluated the modules' design, ease of use, comprehensibility, and learning content. The survey took place from April 2023 to May 2023. Invitations to complete the two online training modules and to participate in the survey (with the aim of improving the modules) were sent to 60 email addresses of animal welfare officers and official veterinarians working in slaughterhouses

in Germany. These email addresses either belonged to personal contacts of the authors or were relevant, public email addresses the authors found on the internet. A cover letter was sent to the email addresses with information about the eschulTS2 project, including a link to the online training modules and to the survey. Descriptive statistical analysis was carried out using the survey program, Limesurvey, Microsoft Excel, and IBM SPSS Statistic.

Results

Demographics

A total of 25 participants responded to the survey and evaluated the two online training modules; one of the 25 did not provide personal information. On average, the participants were 44.2 years old. Most (60%; n = 15) of the participants were female, 36% (n = 9) were male, and one participant (4.0%) did not answer the question on gender (Table 1). Most of the participants were official veterinarians (40.0%), followed by animal welfare officers (32.0%); under the item other profession, participants stated that they worked

Table 1: Demographic data of the survey participants (n = 25).

	Participants
Age	
Mean (SD)	44.2 (12.1)
Median (Min, Max)	47.0 (21.0, 60.0)
Not stated	1
Gender	
Female (%)	15 (60.0%)
Male (%)	9 (36.0%)
Not stated (%)	1 (4.0%)
Profession	
Official veterinarian (%)	10 (40.0%)
Animal welfare officer (%)	8 (32.0%)
Other (%)	5 (20.0%)
Not stated (%)	2 (8.0%)
Education level	
Habilitation (%)	0 (0.0%)
PhD (%)	10 (40.0%)
Degree from a university or comparable (%)	8 (32.0%)
Degree from a university of applied sciences or comparable (%)	3 (12.0%)
Degree of a master craftsman or comparable (%)	1 (4.0%)
Apprenticeship/skilled worker degree or comparable (%)	2 (8.0%)
Not stated (%)	1 (4.0%)
Years in profession	
Mean (SD)	12.3 (9.4)
Median (Min, Max)	10.0 (1.0, 35.0)
Not stated	1

for the industry or as a veterinarian (20.0%). The participants had been working in their professions for an average of 12.3 years (Table 1).

Animal Behavior Module

Evaluation of design and usability of the animal behavior module: About half (56.0%; n = 14) of the participants scored the design and layout of the animal behavior module as 1 (very good), 40.0% (n = 10) scored this aspect of the module as 2 (good), and 4.0% (n = 1) scored it as 3 (satisfactory) (Figure 1). Design and layout received an average score of 1.48 (SD 0.59). The structure of the conveyed content was scored as 1 (very good) by 40.0% (n = 10) of the participants and as 2 (good) by 60.0% (n = 15) (Figure 1), giving a mean score of 1.6 (SD 0.5). The usability of the videos was scored by 48.0% (n = 12) of participants as 1 (very good), by 40.0% (n = 10) as 2 (good) and by 4.0% each (each n = 1) as 3 (satisfactory), 4 (sufficient), or 5 (poor) (Figure 1). Video usability was awarded an average score of 1.67 (SD 1.01). The sound quality of the texts that were read aloud received a score of 1 (very good) from 56.0% (n = 14) of the participants, 2 (good) from 36.0% (n = 9), 3 (satisfactory) from 4.0% (n = 1), and 6 (inadequate) from 4.0% (n = 1) (Fig. 1). The average score for the sound quality of the texts that were read aloud was 1.64 (SD 1.08). The sound quality of the videos was scored as 1 (very good) by 52.0% (n = 13), 2 (good) by 36.0% (n = 9), 3 (satisfactory) by 8.0% (n = 2), and 6 (inadequate) by 4.0% (n = 1) of the participants (Figure 1). On average, the sound quality of the videos was rated 1.72 (SD 1.10). The drawings and animations in the module were scored as 1 (very good) by 56.0% (n = 14), 2 (good) by 40.0% (n = 10), and as 3 (satisfactory) by 4.0% (n = 1) of the participants (Figure 1). Drawings and animations received an average score of 1.48 (SD 0.59). The photos and videos were scored as 1 (very good) by 64.0% (n = 16), 2 (good) by 32.0% (n = 8), and as 3 (satisfactory) by 4.0% (n = 1) of the participants (Figure 1). On average, this resulted in a score of 1.40 (SD 0.58). Usability of the quiz at the end of the animal behavior module was scored as 1 by 56.0% (n = 14) of the participants, 2 by 36.0% (n = 9), and 3 by 8.0% (n = 2) (Figure 1). This resulted in an average score of 1.52 (SD 0.65).

Evaluation of comprehensibility and scope of the animal behavior module: The participants evaluated the comprehensibility of the video content in the animal behavior module, with 52.0% (n = 13) giving a score of 1 (very good), 44.0% (n = 11) scoring it 2 (good), and 4.0% scoring it 3 (satisfactory) (Figure 2). The average score for video comprehensibility was 1.52 (SD 0.59). The participants rated the information gained from the training, with 32.0% (n = 8) giving a score of 1 (very good), 52.0% (n = 13) scoring it 2 (good), 8.0% (n = 2) scoring it 3 (satisfactory), and 8.0% (n = 2) scoring it 4 (sufficient) (Figure 2). The average score for

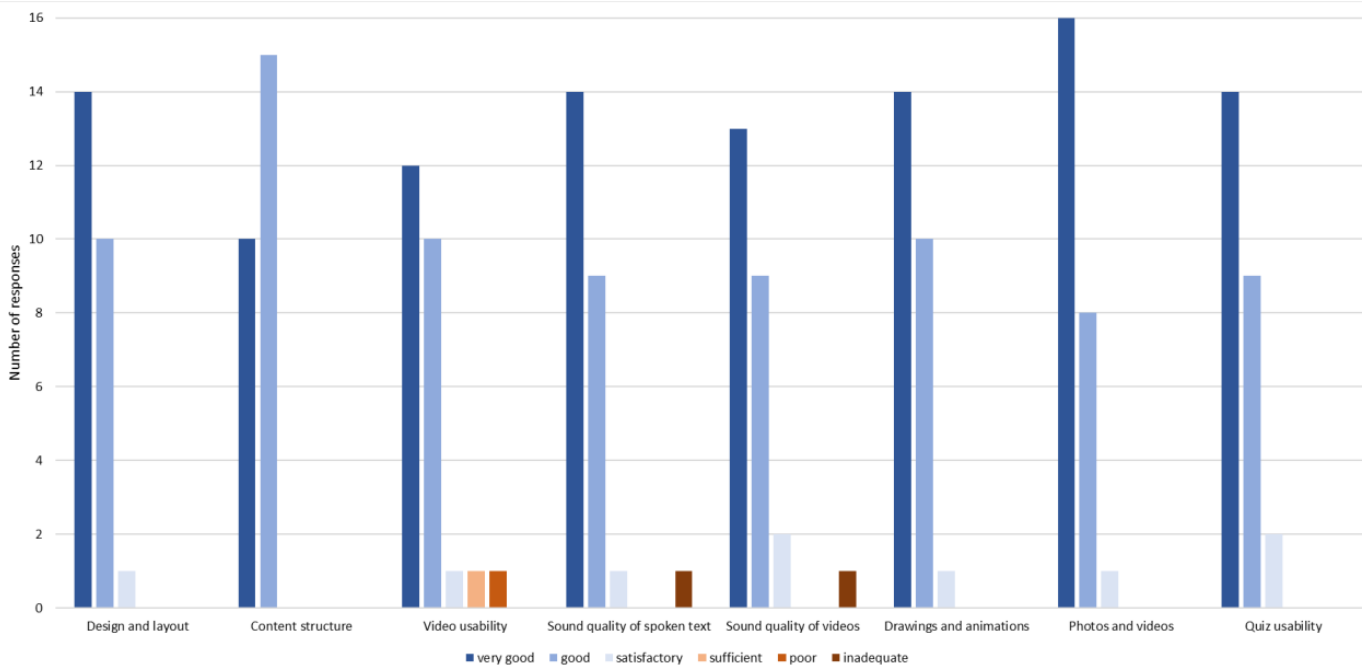


Figure 1: Satisfaction of survey participants with the design and usability of the animal behavior module. Individual items evaluated are listed on the x-axis, with the number of responses on the y-axis. Responses were very good, good, satisfactory, sufficient, poor, or inadequate.

information gained from the training was 1.92 (SD 0.86). The scope of the training (amount of information) was scored as 1 (very good) by 24.0% (n = 6) of the participants, 2 (good) by 64.0% (n = 16), 3 (satisfactory) by 8.0% (n = 2), and 4 (sufficient) by 4.0% (n = 1) (Figure 2). The average score for the scope of training was 1.92 (SD 0.70). The processing time of the module was scored as 1 (very good) by 48.0% (n = 12), as 2 (good) by 48.0% (n = 12), and as 4 (sufficient) by 4.0% (n = 1) (Figure 2). The average score for processing time was 1.60 (SD 0.70).

Evaluation of learning content in the animal behavior module: Within the learning content for the animal behavior module, the topic of cattle vision was scored as 1 (very good) by 52.0% (n = 13) of participants, 2 (good) by 36.0% (n = 9), and 3 (satisfactory) by 12.0% (n = 3) (Figure 3), with an average score of 1.60 (SD 0.70). The topic of cattle hearing was scored as 1 (very good) by 48.0% (n = 12) of the participants, 2 (good) by 48.0% (n = 12), and 3 (satisfactory) by 4.0% (n = 1) (Figure 3), corresponding to an average score of 1.56 (SD 0.58). The topic of mood states of cattle was scored as 1 (very good) by 40.0% (n = 10) of the participants, 2 (good) by 52.0% (n = 13), and 4 (sufficient) by 8.0% (n = 2) (Figure 3). The average score for this topic was 1.76 (SD 0.83). The quiz on the animal behavior module was scored according to its learning content as follows: 40.0% (n = 10) of the participants scored it as 1 (very good), 36.0% (n = 9) as 2 (good), 8.0% (n = 2) as 3 (satisfactory), 12.0% (n = 3) as 4 (sufficient), and 4.0% (n = 1) as 5 (poor) (Figure 3). The average score for the learning content of the quiz was 2.04 (SD 1.17).

Responses to the open questions for the animal behavior module: Participants were asked, “Would you use the ‘animal behavior’ module for your training”, to which 84.0% (n = 21) answered yes and 16.0% (n = 4) did not answer. In the open question, “What I liked about the ‘animal behavior’ module”, 28.0% (n = 7) wrote a comment, and when asked, “This could be improved in the ‘animal behavior’ module”, 48.0% (n = 12) made some suggestions (Table 2).

Cattle handling Module

Evaluation of design and usability of the cattle handling module: Around half (48.0%; n = 12) of the participants scored the design and layout of the cattle handling module as 1 (very good), while 52.0% (n = 13) awarded a score of 2 (good) (Figure 4). The layout and design on average scored 1.52 (SD 0.51). The structuring of the content was scored as 1 (very good) by 52.0% (n = 13), 2 (good) by 44.0% (n = 11), and 3 (satisfactory) by 4.0% (n = 1) (Figure 4), which corresponded to an average score of 1.52 (SD 0.59). The usability of the videos was scored by 52.0% (n = 13) as 1 (very good), by 36.0% (n = 9) as 2 (good), and by 4.0% each (n = 1 each) as 3 (satisfactory), 4 (sufficient), and 6 (sufficient) (Figure 4). Video usability received an average score of 1.76 (SD 1.17). The sound quality of the texts that were read aloud was scored as 1 (very good) by 48.0% (n = 12) of the participants, 2 (good) by 44.0% (n = 11), 3 (satisfactory) by 4.0% (n = 1), and 6 (inadequate) by 4.0% (n = 1) (Figure 4). The average score for the texts that were read aloud was 1.72 (SD 1.06). The sound quality of the videos was rated 1 (very good) by 48.0% (n = 12) of the participants, 2 (good)

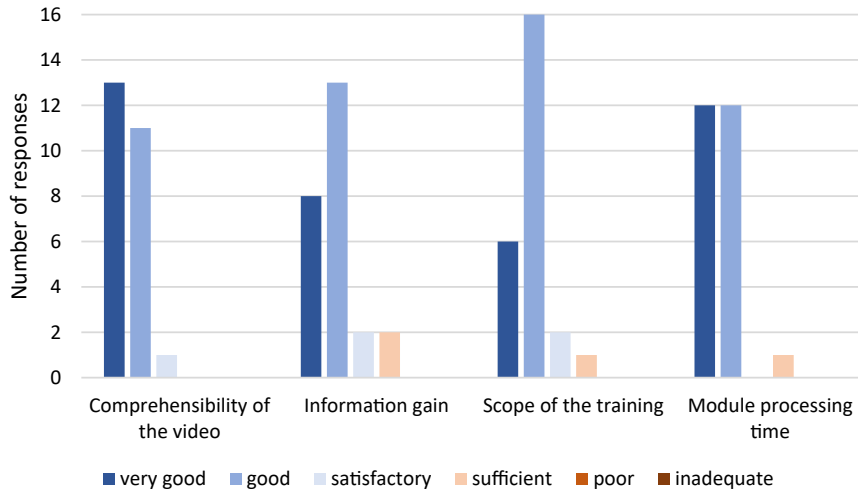


Figure 2: Satisfaction with the comprehensibility and comprehensiveness of the animal behavior module. Individual items evaluated are listed on the x-axis, with the number of responses on the y-axis. Responses were very good, good, satisfactory, sufficient, poor, or inadequate.

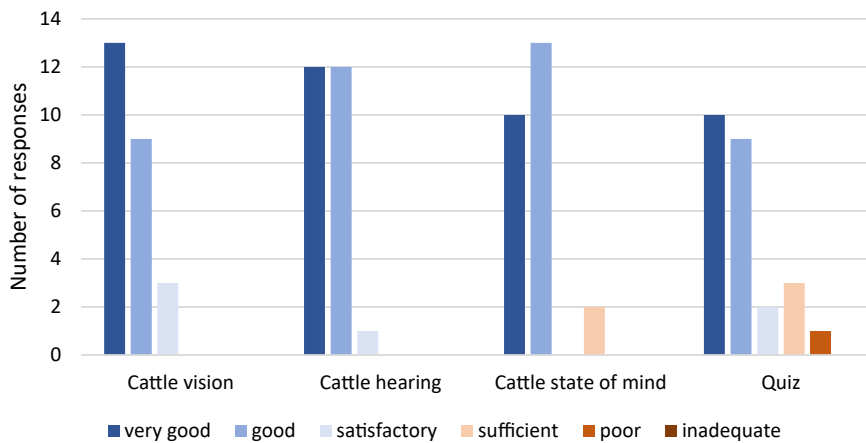


Figure 3: Satisfaction of the learning content of the animal behavior module. Individual items evaluated are listed on the x-axis, with number of responses on the y-axis. Responses were very good, good, satisfactory, sufficient, poor, or inadequate.

by 40.0% (n = 10), 3 (satisfactory) by 8.0% (n = 2), and 6 (inadequate) by 4.0% (n = 1) (Figure 4). The sound quality of the videos received an average score of 1.76 (SD 1.10). The drawings and animations of the cattle handling module were scored as 1 (very good) by 52.0% (n = 13) of participants and as 2 (good) by 48.0% (n = 12) of participants (Fig. 4) and, therefore, received an average score of 1.48 (SD 0.51). Photos and videos were scored as 1 (very good) by 52.0% (n = 13) and as 2 (good) by 48.0% (n = 12) of the participants (Figure 4). On average, this resulted in a score of 1.48 (SD 0.51). Most (56.0%; n = 14) of the participants scored the user-friendliness of the quiz at the end of this module as 1, 40.0% (n = 10) as 2, and 4.0% (n = 1) as 3 (Figure 4). This corresponded to an average score of 1.48 (SD 0.59).

Evaluation of comprehensibility and scope of the cattle

handling module: The comprehensibility of the video content was scored 1 (very good) by 64.0% (n = 16) and 2 (good) by 36.0% (n = 9) of the participants (Figure 5). The average score for comprehensibility of the cattle handling module was 1.36 (SD 0.49). The participants scored the information gained from the training as 1 (very good) by 32.0% (n = 8), 2 (good) by 56.0% (n = 14), and 3 (satisfactory) by 12.0% (n = 3) (Figure 5). The average score was 1.80 (SD 0.65). The additional information for animal welfare officers was scored 1 (very good) by 28.0% (n = 7), 2 (good) by 48.0% (n = 12), 3 (satisfactory) by 12.0% (n = 3), and 4 (sufficient) by 12.0% (n = 3) (Figure 5), giving an average score of 2.08 (SD 0.95). The scope of the training (amount of information) was scored 1 (very good) by 36.0% (n = 9) of the participants, 2 (good) by 52.0% (n = 13), 3 (satisfactory) by 12.0%

Table S2: Positive comments (+) and suggestions by participants for improvement (-) for the animal behavior module. The list of summarized comments was translated by the authors from German.

Comments on the layout and design:	
+	Simply designed, but all-important information processed.
+	The topics are clearly presented.
+	Good animations.
-	Speaker's voice is monotonous.
-	Video guidance is complicated.
-	The clicking on the microphones should be removed.
Comments on the content:	
+	Understandable and simply explained.
+	Short and comprehensible.
+	Cattle vision: Comparison human - bovine (with blurring), drift, adaptation = very good.
+	Cattle state of mind: bull with attentive behavior = good!
+	The topics are not boring.
+	Comparison human to animal was very good.
-	More comprehensive information would be nice.
-	Comparisons with humans would be more purposeful.
-	In the example of aggressive behavior there was only one example of how the animals behave towards each other.
-	Speak less in the subjunctive, that could trivialize.
-	When it comes to noise, it should be reduced as much as possible through technical methods e.g., insulation.
-	There are many other aspects that can be covered, from loading the animal on the farm, animal transport regulations and rules on distances to be kept and calls, differences in emergency slaughter.
-	Possibly a second quiz question per unit.
-	Quiz a bit too ridiculous.

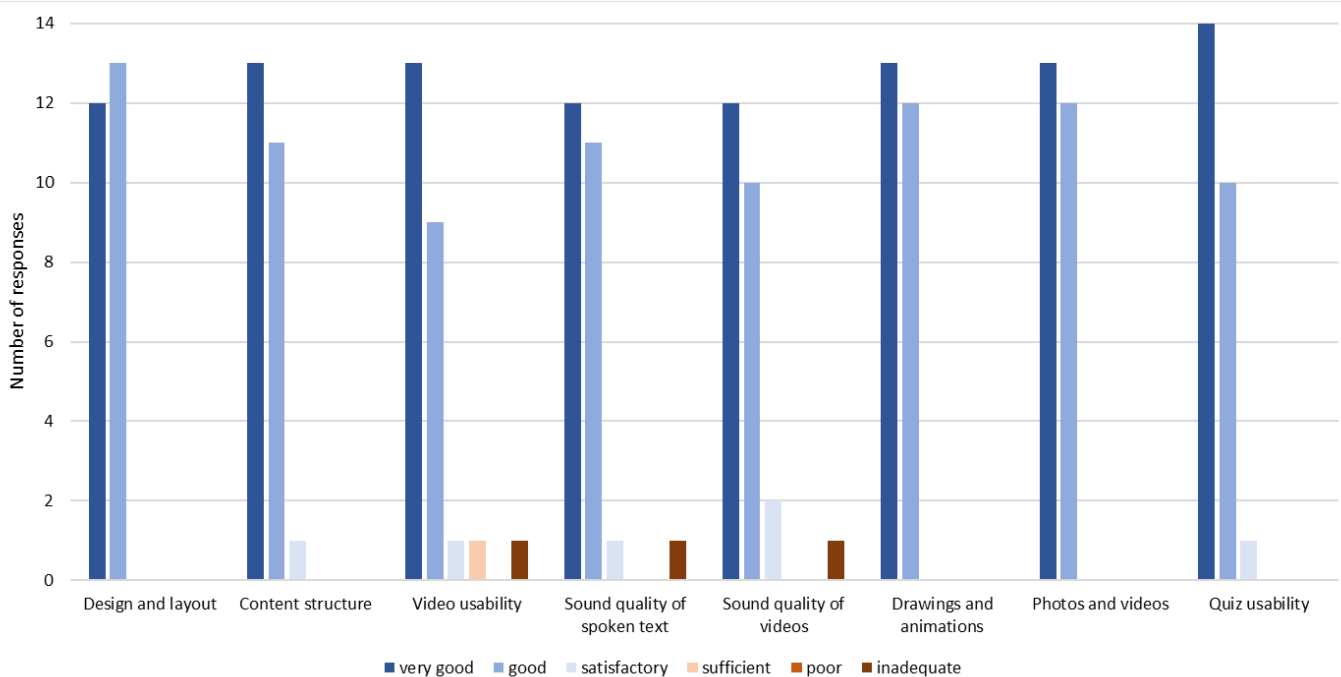


Figure 4: Satisfaction with the design and usability of the cattle handling module. Individual items evaluated are listed on the x-axis, with the number of responses on the y-axis. Responses were very good, good, satisfactory, sufficient, poor, or inadequate.

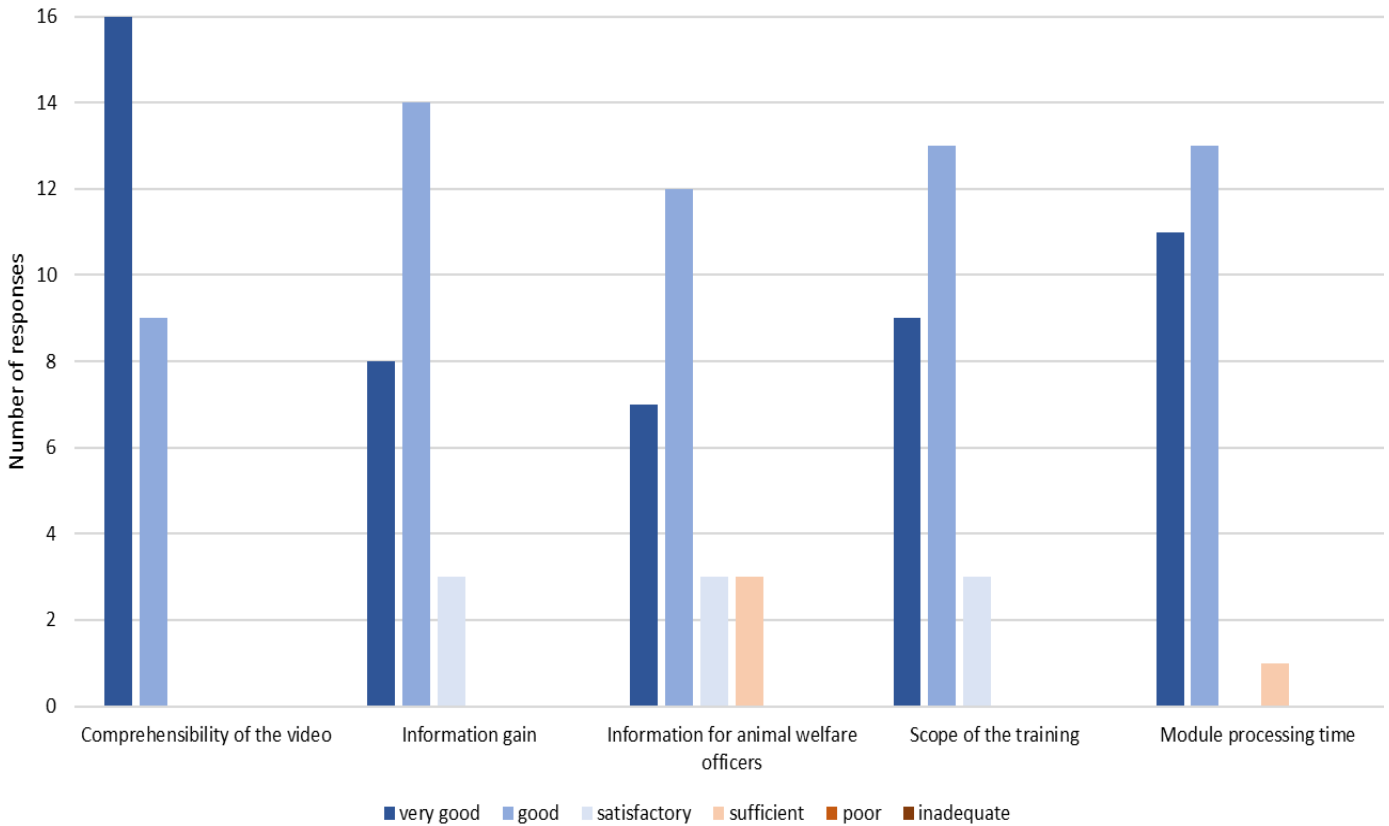


Figure 5: Satisfaction with the comprehensibility and comprehensiveness of the cattle handling module. Individual items evaluated are listed on the x-axis, with the number of responses on the y-axis. Responses were very good, good, satisfactory, sufficient, poor, or inadequate.

(n = 3), and 4 (sufficient) by 4.0% (n = 1) (Figure 5). The average score for the scope of the training was 1.76 (SD 0.66). The processing time for the module was scored 1 (very good) by 44.0% (n = 11) of participants, 2 (good) by 52.0% (n = 13), and 4 (sufficient) by 4.0% (n = 1) (Figure 5). The average score was 1.64 (SD 0.70).

Evaluation of learning content in the cattle handling module: Within learning content for the cattle handling module, the topic of the legal basis was scored 1 (very good) by 40.0% (n = 10) of the participants, 2 (good) by 32.0% (n = 8), 3 (satisfactory) by 16.0% (n = 4), and 4 (sufficient) by 12.0% (n = 3) (Figure 6), with an average score of 2.00 (SD 1.04). The topic of basic instructions was scored 1 (very good) by 36.0% (n = 9) of the participants, 2 (good) by 56.0% (n = 14), and 3 (satisfactory) by 8.0% (n = 2) (Fig. 6), with an average score of 1.72 (SD 0.61). Within learning content, the topic of driving aids used on animals was rated 1 (very good) by 44.0% (n = 11) of the participants, 2 (good) by 48.0% (n = 12), and 3 (satisfactory) by 8.0% (n = 2) (Figure 6). The average score for this topic was 1.64 (SD 0.64). The topic of electric prods was scored as follows: 48.0% (n = 12) of participants scored it 1 (very good), 40.0% (n = 10) scored

it 2 (good), 4.0% (n = 1) scored it 3 (satisfactory), 4.0% (n = 1) scored it 4 (sufficient), and 4.0% (n = 1) scored it 5 (poor) (Figure 6). The average score for the topic of driving aids was 1.76 (SD 1.01). The topic of prohibited driving aids was scored 1 (very good) by 56.0% (n = 14) of the participants, 2 (good) by 32.0% (n = 8), and 3 (satisfactory) by 12.0% (n = 3) (Figure 6), giving an average score of 1.56 (SD 0.72). The quiz was scored as 1 (very good) by 40.0% (n = 10) of the participants, 2 (good) by 40.0% (n = 10), 3 (satisfactory) by 12.0% (n = 3), and 4 (sufficient) and 5 (poor) each by 4.0% (n = 1 each) (Figure 6). The average score for the quiz was 1.92 (SD 1.04).

Responses to the open questions for the cattle handling module: Participants were asked if they would use the cattle handling module for their training. While the vast majority (84.0%; n = 21) answered yes, 16.0% (n = 4) did not indicate their preference. In response to the open-ended question, “What I liked about the ‘cattle handling’ module”, 16.0% (n = 4) provided their own opinion in a comment, and in response to the question, “What could be improved about the ‘cattle handling’ module”, 32.0% (n = 8) answered with a comment (Table 3).

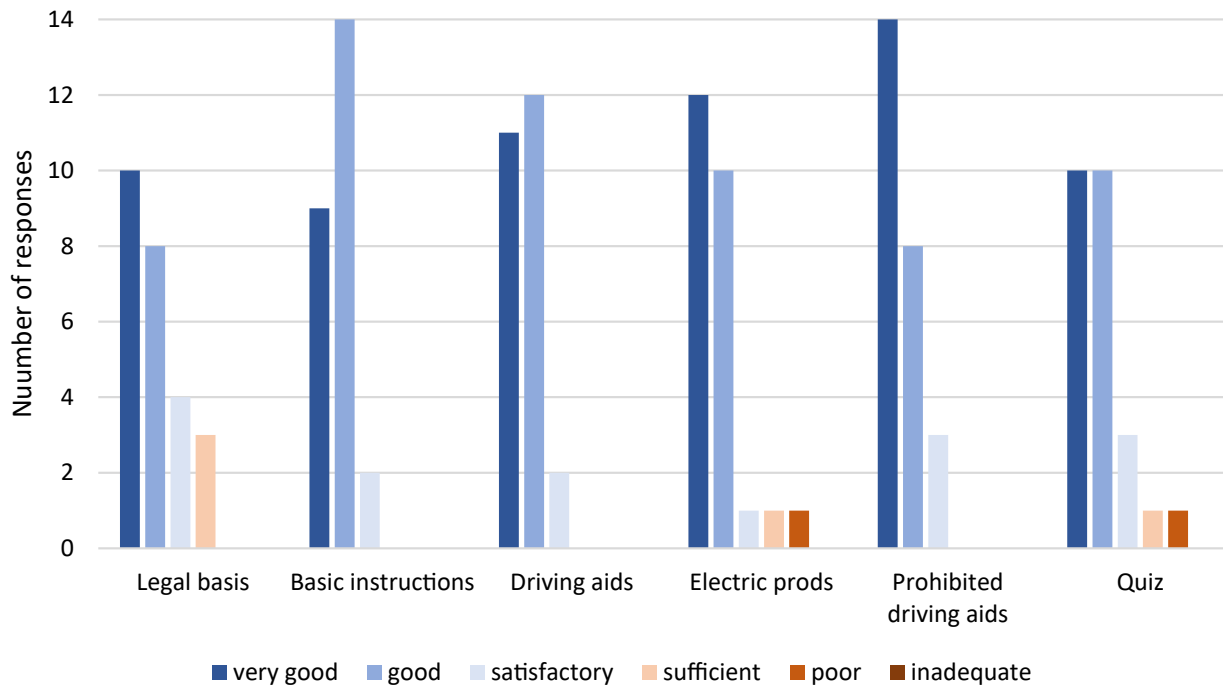


Figure 6: Satisfaction of the learning content of the cattle handling module. Individual items evaluated are listed on the x-axis, with number of responses on the y-axis. Responses were very good, good, satisfactory, sufficient, poor, or inadequate.

Table S3: Positive comments (+) and suggestions for improvement (-) for the cattle handling module mentioned by the participants. List of translated and summarized comments from German.

Comments on the layout and design:	
+	Simply designed, but all-important information processed.
+	The topics are clearly presented.
+	Good animations.
+	Cartoons and schematic illustration of the use of prohibited propellants.
-	Video guidance is complicated.
-	The clicking on the microphones should be removed.
Comments on the content:	
+	Easy to understand, directly applicable in practice, does not expire
+	Short and comprehensible.
+	Good: Use of paddles for propellants and advantages for the employers' liability insurance association.
-	Too simple for animal welfare officers.
-	Video electric prod use: start with the prohibitions and then explain the correct use. When explaining the correct use, the cattle should be in a single drive as instructed.
-	Visual illustration of the consequences and damage.
-	One additional quiz question per unit.
-	Prohibition of use on sick/ambulatory animals: Here the use on the back is shown without addressing the illegality of the use at this location.
-	Legal basis Animal welfare officers not highlighted.

Discussion

Out of the 60 people contacted, 25 answered the survey in complete form, a response rate of 41.67%. This might have been higher if all participants had been contacted directly, but some could only be reached via the public e-mail addresses of the veterinary offices in Germany. With only 25 participants, one limitation of the study is the small number of participants. However, it must be taken into account that the number of cattle slaughterhouses in Germany and the number of animal welfare officers and official veterinarians working there is lower than the number of pig abattoirs, and the number of cattle slaughtered in 2022 fell in comparison with previous years [11,12]. Accordingly, there are probably fewer experts in this field. Furthermore, this study should be seen as just one type of pre-evaluation, since two pilot modules were evaluated by animal welfare officers and official veterinarians before the eSchULTS² project was completed, and the training material could be evaluated in its entirety by all users after completion. A high percentage (60.0%) of our survey participants were female. One reason for the higher proportion of females participating in the study could be the situation at German veterinary universities, which currently are attended by more than 80% female students [13]. Another reason could be that compared with males, females have greater sensitivity to animal welfare [14] and consequently greater interest in contributing to a survey on this issue.

Altogether, 32.0% of the survey participants were animal welfare officers. They are familiar with training courses for

slaughterhouse employees, they are involved in developing or conducting such training courses themselves [15], and we speculate that they are critical and learned enough to evaluate other training courses as well. In addition, animal welfare officers provide work and action instructions in accordance with animal welfare considerations [6]. Five participants chose other as their profession, although we contacted only animal welfare officers and veterinary offices. It is possible that participants forwarded the mail to other colleagues with expertise in the field. This could also be the reason why three participants did not select a university education for the item level of education, even though veterinarians must be educated at this level. With an average of over 12 years in professions that require knowledge of animal welfare, it can be assumed that the survey participants have expertise in the slaughter process and/or livestock transport.

Evaluation of the animal behavior module

The design and layout of the module were highly rated by participants, with 96.0% considering it good to very good. The structuring of the content was also positively assessed by 60.0% of participants, emphasizing its effectiveness in presenting information. These results indicate that the module's design and layout contribute to its overall usability and potential for effective training. Online learning can cause frustration or little enthusiasm for many participants [16]. Nonetheless, approaches to address deficiencies in the learning experience can be found in the area of usability [17]. A well rated usability has several components and brings five attributes into training: learnability, efficiency, memorability, errors, and satisfaction [18]. Feldstein [19] said of usability: "Usability of e-learning is about the way the content is presented, not just the content itself." One participant (4.0%) gave a negative rating of 5 (poor) for the usability of the videos. Consistent with this negative evaluation, open questions for both modules were the comment, "Video guidance is complicated." The reason for this poor rating and the comment could be that the videos cannot simply be fast-forwarded and the participants had to watch each video until the end. However, this feature was set up by us on purpose to prevent people from clicking through the module without watching and learning the content of the videos. The sound quality of the explanations activated by the loudspeaker icons and the videos was rated 6 (inadequate) by one participant (4.0%). Since most participants gave a positive rating here, it is possible that this participant had technical problems with loudspeakers or headphones on their computer. Nonetheless, these ratings indicate areas where the modules can be improved, particularly with regard to the usability of the videos and sound quality. Participants found the video content to be highly comprehensible, with 96.0% considering it good to very good. Moreover, the majority (52.0%) acknowledged that the module provided valuable information, indicating its effectiveness in enhancing knowledge acquisition. In order to

acquire knowledge and to understand what has been learned, a certain amount of prior knowledge is always needed [20], which we expect the well-educated participants in our survey, animal welfare officers or official veterinarians, should have. It is a moot point whether also would apply to any less qualified slaughterhouse employees, especially if they have little school education and/or limited language skills. However, analysis of the participants' previous knowledge was outside the scope of this study. The scope of the training was generally considered to be adequate, with 64.0% rating it as good. This indicates that the animal behavior module successfully provides understandable and relevant contents. The learning content related to vision and listening was highly rated, with 100% of participants rating it good or very good. Similarly, the topic of mood states of cattle received positive feedback, with 40.0% rating it as very good. The quiz on the module was also positively evaluated, indicating that participants found it beneficial for reinforcing their learning success. The quizzes at the end of each module were only intended to reinforce and recall the knowledge learned [21]. If a quiz is too complex, it can lead to frustration among participants [21]. Nevertheless, the quiz for the animal behavior module was scored by one participant as 5 (poor), and also commented on as "ridiculous" in the open questions. The possible reasons for this rating and comment could be a misunderstanding of the operation or differing expectation towards the quiz. In the open questions it was suggested: "the clicking on the microphones should be removed", which could mean that the sound should be played directly without the learner having to click, or that reading the text aloud was considered by the participant to be unnecessary. On the one hand, the learners should not be overburdened with a voice that directly talks to them, and therefore, the ability for learners to deliberately click on the loudspeaker icons was installed. On the other hand, it is very important that learners with literacy issues can understand the lesson by having the texts read aloud. One comment was that there should be more comprehensive information. With a view to the target learner groups of less qualified slaughterhouse work hands and livestock transport drivers, the short learning units should convey the essential information relevant to animal welfare, but should not overwhelm the learners. The comment, "When it comes to noise, it should be reduced as much as possible by technical measures such as isolation", is relevant and was recommended previously [22], but noise reduction measures have to be implemented by the slaughterhouse management and are not always within the direct influence of the learners targeted by our training modules. Nonetheless, in the online training, learners are instructed to speak to the animals in a calm voice and to avoid shouting in order to keep the noise level low. In the open questions, it was also suggested that there are many other aspects that could be covered in the online training, such as loading the animals onto the transport vehicle at the farm, animal transport regulations, and

emergency slaughter regulations. A module on transportability of livestock is already underway for the online training, which will cover some of the aspects mentioned. However, although it is a very interesting and relevant topic, emergency slaughter did not fit into the aims of this study or project. Overall, the animal behavior module was well-received, with 84.0% of participants expressing their willingness to use it for training. This very positive acceptance of new animal welfare training courses could be due to the fact that there is a great need for illustrative training material for different target groups in the slaughterhouse industry in German-speaking countries [23]. Good training of employees in livestock production is vital to ensure animal welfare [22].

Evaluation of the cattle handling module

The design and layout of the cattle handling module received extremely positive ratings, with 48.0% considering it very good and 52.0% rating it as good. The usability of videos, sound quality, drawings, animations, and photos/videos were generally well-regarded. These findings suggest that the module's design elements effectively support its usability and audiovisual content. For the visual implementation in both modules, the positive ratings, and mentions in the open questions, could be because video-based e-learning with animations can lead to better learning results [24]. Similar to the animal behavior module, the usability of the videos in this module was rated as inadequate by one participant (4.0%). This could be attributed to the fact that the videos cannot be fast-forwarded, as mentioned above. And as already stated for the previous module animal behavior, the sound quality of the information read aloud by clicking on the loudspeaker icons and the sound quality of the videos were rated by as inadequate by one participant. Here, again, technical problems on the participant's computer might have contributed to this poor rating. Participants assessed the video content in the cattle handling module as highly comprehensible, with 64.0% rating it as very good. Additionally, the majority (56.0%) recognized the module as a valuable source of information, supporting its effectiveness in enhancing knowledge. The additional information provided for animal welfare officers was also well-received, highlighting its relevance. The scope of the training was rated positively, indicating that it covered the necessary content. As the animal welfare officers in the slaughterhouses are mostly veterinarians, the information videos for this target group are designed with more text and the contents are more complex. Similar to the animal behavior module, the quiz on the entire module was rated as poor by one participant. Here, again, the reason could be on the user's part or a differing expectation of the quiz on the participant's part. A low rating indicates that the participant found some aspects of the module unsatisfactory or inadequate. The interactive elements of the quiz might have irritated some of the participants. At the same time, a quiz can stimulate offers in the subject area, could convey the content better than

other learning elements, and can even have a lasting learning effect [25]. A quiz on a particular topic can help to acquire new skills or consolidate existing ones and can also be fun, thereby achieving several aims at the same time [25]. In the open questions, on the video concerning electric prod use, participants comments were, "When explaining the correct use, the cattle should stand in a single drive as instructed" and "speak less in the subjunctive, that could trivialize". This will be taken into consideration and will be used to graphically and linguistically improve our online training modules. The comment, "Visual illustration of consequences and damage" is important and will be included in an additional module of our online training. One suggestion from a participant regarding the quiz was to implement "one additional quiz question per unit". This is a valuable comment, especially in terms of reinforcing knowledge. We acknowledge, however, that it would make the modules longer (timewise) and could lead to more dropouts who do not finish their online training. Another comment was the "legal basis for animal welfare officers is not highlighted", which is true regarding the videos in this module. More information aimed at animal welfare officers was accessible by clicking an information button on the start page of this module, providing the respective legal requirements for each topic. Possibly this additional information button was not accessed by the participant, or this additional information was not regarded as detailed enough. The learning content on legal requirements and basic instructions within the cattle handling module received favorable ratings, indicating their effectiveness in providing valuable knowledge. However, there is room for improvement in certain areas, as some participants expressed suggestions for enhancement.

Conclusion

The overwhelming majority of participants evaluated the two online training modules positively, which suggests there is a need for this type of training. However, the online training modules need to be improved on the basis of participants' criticisms. Particular attention must be paid to sound quality, properly directing module content to the level of employee education. The overall aim of the set of training modules is to improve animal welfare during transport and around slaughter. Further studies will be needed to determine if animal welfare is actually improved as a result of transport and slaughterhouse employees completing the modules.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Funding

This study was conducted in the framework of the joint

research project eSchulTS² (Development of target group-specific e-learning modules to improve animal welfare during transport and slaughter of cattle and pigs) which is funded by the German Ministry of Food and Agriculture (grant no. 2817806A18). The publication of this article was funded by the Freie Universität Berlin.

Acknowledgments

We would like to thank the members of the entire eSchulTS² team for their excellent cooperation.

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With your support and practical experience, we want to evaluate two pilot modules from the area of animal welfare during transport and slaughter in order to optimise the implementation of the training.

In the following 18 questions you can evaluate the design and content of the modules animal behavior and cattle handling. At the end there will be questions about yourself. All data will be recorded and evaluated anonymously. It will take about 10 minutes to complete.

The data collected is part of the joint project eSchulTS2 funded by the Federal Ministry of Food and Agriculture (funding code: 2817806A18) and will be statistically analysed and published.

Tip: watch the training in parallel to this evaluation, this will make it easier to answer the questions.



Part A: Questions about the module animal behavior

A1. The following tables are based on the school grading system and are intended to be an assessment on your part for the module animal behavior. (1 very good, 2 good, 3 satisfactory, 4 sufficient, 5 poor, 6 inadequate)

	1	2	3	4	5	6
How satisfied are you with the design and layout?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the structuring of the content?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the usability of the videos?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the sound quality of the speaker icons?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the sound quality of the videos?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the drawings and animations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with photos and videos?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the usability of the quiz?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A2. How do you rate the following points about the module animal behavior? (1 very good, 2 good, 3 satisfactory, 4 sufficient, 5 poor, 6 inadequate)

	1	2	3	4	5	6
Comprehensibility of the video content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information gain through the training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scope of the training (amount of information)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Processing time of the training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A3. How would you rate the learning content of the module animal behavior? (1 very good, 2 good, 3 satisfactory, 4 sufficient, 5 poor, 6 inadequate)

	1	2	3	4	5	6
Cattle seeing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cattle hearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cattle states of mind	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concluding quiz	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



A4. Would you use the animal behavior module for your trainings?

Yes

No

A5. That's what I liked about the animal behavior module (optional):

A6. This could be improved on the animal behavior module (optional):

Part B: Questions about the module cattle handling

B1. The following tables are based on the school grading system and are intended to be an assessment on your part for the module cattle handling . (1 very good, 2 good, 3 satisfactory, 4 sufficient, 5 poor, 6 inadequate)

	1	2	3	4	5	6
How satisfied are you with the design and layout?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the structuring of the content?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the usability of the videos?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the sound quality of the speaker icons?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the sound quality of the videos?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the drawings and animations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with photos and videos?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How satisfied are you with the usability of the quiz?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



B2. How do you rate the following points about the module cattle handling? (1 very good, 2 good, 3 satisfactory, 4 sufficient, 5 poor, 6 inadequate)

	1	2	3	4	5	6
Comprehensibility of the video content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information gain through the training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional information of animal welfare officers (legal basis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scope of the training (amount of information)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Processing time of the training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B3. How would you rate the learning content of the module cattle handling? (1 very good, 2 good, 3 satisfied, 4 sufficient, 5 poor, 6 inadequate)

	1	2	3	4	5	6
Legal basis (of animal welfare officers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basic information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving with aids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electric prods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prohibited driving aids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concluding quiz	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B4. Would you use the cattle handling module for your trainings?

Yes

No

B5. That's what I liked about the cattle handling module (optional):



B6. This could be improved on the cattle handling module (optional):

Part C: Questions on person

C1. How old are you?

C2. What sex are you?

female

male

C3. In which field do you work?

Animal Welfare Officer

Official veterinarian

Other

Other

C4. How long have you been working in this field (in years)?

C5. On which device did you view the training?

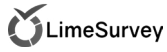
Computer/ Laptop

Tablet

Smartphone

Other

Other



C6. Further comments (optional):

Thank you for your participation in the evaluation.