Evaluation of the Eveal program among the participants

Universiteit Utrecht

eveal
naar een **next level**
in kalvergezondheid

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19-7-2021

Content

Samenvatting

Eveal is een online trainingsprogramma ontworpen door de dierenartsen van dierenartsen-praktijk Thewi, Universiteit Utrecht en de Nederlandse Land- en Tuinbouworganisatie (LTO). Het online leerprogramma streeft naar het verbeteren van ziektepreventie- en herkenning onder kalverhouders. De makers van het programma zouden graag willen weten of het leerprogramma verandering in het gedrag van de kalverhouders teweegbrengt op het gebied van vroege ziekte herkenning, eerder ingrijpen wanneer er iets mis is, meer preventieve maatregelen en verminderd gebruik van antibiotica op het bedrijf.

In dit onderzoek is het Eveal programma geëvalueerd door middel van een enquête. De enquête is via email verstuurd naar alle deelnemers van het Eveal programma, zowel naar de kalverhouders als adviseurs en andere in de kalverindustrie betrokken personen. We hebben 35 ingevulde enquêtes teruggekregen met een responspercentage van 20,6%. De enquête bestond met name uit vragen met een 7-puntse Likert schaal waarmee in totaal 7 verschillende gedragsveranderingen werden gemeten. Uit de resultaten bleek dat bij 3 van deze gedragsveranderingen het gemiddelde boven het middelpunt van de schaal lag en wij een mogelijke gedragsverandering hebben gevonden. Gedragsverandering werd waargenomen bij 'verandering in houding tegenover preventieve maatregelen' met een gemiddelde van 4,8 (*SD* van 1,2). Ook zien we dat de participanten sneller ingrijpen wanneer er iets mis is met de kalveren aangezien 'Sneller ingrijpen' een gemiddelde heeft van 4,6 (*SD* van 1,0). Als laatste zien we dat 'Op een andere manier naar de dieren kijken' een gemiddelde score van 4,8 (*SD* van 1,2) had waardoor wij concluderen dat het volgen van de Eveal modules ervoor zorgt dat de participanten op een andere manier naar de kalveren kijken.

Naast de meting gedragsveranderingen hebben we ook het theoretische COM-B model gebruikt om te kijken of we hiermee de gedragsveranderingen kunnen verklaren en voorspellen. Hiervoor hebben we met behulp van vragen met 7-puntse Likert schaal de '*capability*', '*opportunity*' en '*motivation*' van de respondenten gemeten. Deze 3 componenten werden gebruikt als onafhankelijke variabelen in lineaire regressies waarbij de 7 gedragsveranderingen werden gebruikt als afhankelijke variabelen. We vonden dat de respondenten bereid zijn om 'Meer discussies' te voeren met dierenartsen of adviseurs wanneer hun '*capability*', '*opportunity*' en '*motivation*' verhoogd ($F_{(4,22)} = 5,91$, $p = 0,02$). Alle andere associaties waren niet significant.

Als laatste hebben we de respondenten gevraagd om het antibioticagebruik op hun bedrijf te kwantificeren. We hebben de cijfers vergeleken met antibiotica rapport van de SDa uit 2019. We zagen geen significante daling in het gebruik van antibiotica onder de respondenten na het volgen van de Eveal modules vergeleken met de cijfers uit het SDa rapport.

We concluderen dat het Eveal programma wel veranderingen in gedrag teweeg kan brengen in het kader van verandering in houding tegenover preventieve maatregelen, verandering in het sneller ingrijpen wanneer er iets mis is met de dieren en verandering in de manier waarop ze naar de dieren kijken. Er moet wel rekening worden gehouden met het feit dat deze veranderingen niet significant bewezen zijn en daarom kan verder onderzoek worden gedaan. Ook kan dan worden gekeken naar andere theoretische modellen, zoals de '*theory of planned behaviour*' om een verklaring te vinden voor de gedragsveranderingen.

Abstract

The Eveal program was founded by veterinarians from the Thewi veterinary practice in co-operation with Utrecht University and the Netherlands Agricultural and Horticultural Association. The aim of the program is to improve disease prevention and the early detection of sick animals by educating veal calf farmers. The builders of the program would like to know if their learning program results in a change of behaviour among the participants in relation to earlier sickness recognition, intervening quicker when something is wrong, implementation of more preventative measures and a lower use of antibiotics.

We therefore conducted a survey to evaluate the Eveal program. The survey was sent out to all participants of the Eveal program since it went live. This included farmers as well as advisors or otherwise involved individuals. We received 35 completed responses with a response rate of 20,6%. The survey consisted mostly of Likert scale questions on a 7-point scale which measured in total 7 different behavioural change components. The participants showed a possible behavioural change in 3 out of these 7 components after following the Eveal program, as they scored above the halfway point of the scale. First, participants have a 'change in attitude towards preventative measures', as this component had a mean score of 4,8 (SD of 1,2). The results also suggest that the participants intervene quicker when something is wrong with the animals as the item 'Intervene quicker' had a mean score of 4,6 (SD of 1,0). Given that the item 'Different look on animals' had a mean score of 4,8 (SD of 1,2), our results suggests that the Eveal program changed the way respondents look at the animals. In addition to these behavioural change components, we also used the COM-B framework to explore the possibilities for behavioural changes. For this framework another set of 7-point Likert questions was used to measure capability, opportunity and motivation of the participants. These variables were then used as independent variables in a linear regression models with the 7 components of behavioural change as the dependent variables. We found that participants are willing to go into 'more discussions' with veterinarian or advisors when their capability, opportunity and motivation increases (F (4,22) = 5,91, p = 0,02). Other associations appeared not significant.

Finally, respondents were asked to quantify the antibiotic use on their farm. We compared their use with data published by the 2019 SDa report on antibiotic use among Dutch veal calves. There was no significant decrease in antibiotic use found among the participants compared to the numbers in the SDa report.

We concluded that the Eveal program can induce a change in behaviour concerning a change in attitude towards preventative measures, change in intervening quicker when something is wrong and a different look on the animals. However, these changes were not significantly proven and therefore further research could be done with other theoretical frameworks, such as the theory of planned behaviour.

Introduction

Dutch veal calf industry

Cows need a calf in order to produce milk but not all of these calves are needed for the replacement of the dairy herd. The surplus calves from the dairy farms are fattened and these veal calves are regarded as a by-product of the dairy industry (Pardon et al, 2014). The economic success of the veal industry resulted in an import of a large number of foreign calves and currently the Dutch veal calves account for over one third of the Dutch cattle population (Santman-Berends et al, 2018).

There are two types of veal farms in the Netherlands: white veal and rosé veal. The differences between the two types is the feed they receive during their fattening period. White veal calves predominantly receive milk replacements, which gives their meat a more white colour, while rosé veal calves are predominantly fed with grain products which makes their meat more red (Pardon et al, 2014, Jarrige et al, 2017).

The production process of veal calves starts at the time of arrival at the veal herd up to the time of slaughter. A production cycle has a duration of 6-8 months and is usually an all-in all-out system at barn level (Pardon et al, 2012a). The average age of the calves at the time of arrival at the veal herd depends on the origin of the calves. Calves originating form Dutch cattle herds arrive at an average age of 17 days. Imported calves are on average 21 days old at arrival (Santman-Berends et al, 2018). Nearly all calves arrive at the veal farm after sorting at a collection centre. At the veal farm, the animals are housed in groups of 4-10 animals that are grouped based on weight and feed intake. During the production cycle some calves are relocated to ensure the groups are as homogenous as possible (Bos et al, 2012).

Integrations

In the Netherlands, the veal calf industry is organized by so-called integrations. These integrations cover all domains of the veal meat production: calf trading, animal transportation, feed production, animal care and housing slaughter, and meat sales (Jarrige et al, 2017). The integrations are more industrialized and therefore substantially different from the dairy industry or traditional beef production (Damiaans et al, 2019, Pardon et al, 2014).
The emergence of these integrations facilitated the upscaling of a highly efficient production process from a logistic point of view (Berkhout et al, 2011). Unfortunately, the burden of disease in the veal sector reasonably high.

Mortality and Morbidity

Young animals are very susceptible to infections and calves are no exception (Hill et al, 2009, Jarrige et al, 2017). Calf diseases are of great importance in veal production because they have a negative impact on calf welfare and causes economic losses due to growth retardation and preliminary death (Bähler et al, 2012). Pardon et al. (2013) showed that calves with bovine respiratory disease or diarrhoea had a reduced hot carcass weight and in some cases a reduced carcass quality as well. Diarrhoea and respiratory diseases such as bronchopneumonia and interstitial pneumonia are the main cause of mortality among veal calves (Bähler et al, 2012, Santman-Berends et al, 2018). According to Bähler et al. (2012) important risk factors for the mortality and morbidity of respiratory infections in these calves are stress during transportation, over-crowding, comingling of calves from different farms, housing in large groups size with limited space per calf and insufficient wind deflection in the winter season. Wind deflection is defined as insufficient when less than three sides of a stable

can be closed because this results in drafts. These drafts make the calves more susceptible to disease (Cusack et al, 2007).

Besides the effect on animal welfare and the economic losses, infectious diseases need to be treated with antibiotics to prevent that they cause premature death. The high morbidity is therefore one of the reasons for the high antibiotic use in the veal calf industry (Scott et al, 2020).

Antibiotics

Antimicrobial resistance is one of the most important health threats in human and veterinary medicine. When different livestock systems are compared, the highest levels of antimicrobial resistance are found in pigs, poultry and veal calves. This is mostly due to the multiple antimicrobial oral mass medications they receive (Pardon et al, 2012b).

Previous studies on antibiotic use on veal farms show that there is a large variation in antimicrobial use. Some farms hardly use any antibiotics while other farms use them intensively (Bokma et al, 2019, Pardon et al, 2012b).

Looking at the use of antibiotics on veal farms in the Netherlands, it appears that there is a substantial decrease in use over the years reported. But even though the amount of antibiotics used in the industry decreases gradually over the years, the Dutch SDa report of 2019 shows that the use of antibiotics in the veal calf industry is still much higher compared to other cattle sectors. Compared to all the livestock sectors, antibiotic use in the veal calf industry is among the highest. The SDa therefore recommend the industry to implement a plan to prevent infectious diseases in order to achieve a reduction in the use of antibiotics.

The SDa uses the so-called DDDA (defined daily dose animal) as an indication of the amount of antibiotics used on a farm. It is the sum of the treatable kilograms present at the farm in a year, divided by the average kilograms animal present at the farm. The SDa report divides the veal calf sector into four different sections: white veal, rosé start veal, rosé fattening veal and rosé combination veal (SDa, 2019).

Biosecurity

Biosecurity seems a key component to reduce the spread of pathogens within a herd (Damiaans, 2018). The shift from cure toward prevention could be established by implementing biosecurity measures on the farms (Damiaans et al, 2019).

Bähler et al. (2012) reported multiple management measures which had proven to be able to reduce the morbidity and mortality on veal farms. These measures included cleaning the barn, optimization of ventilation, and the ad libitum availability of water. Damiaans et al. (2019) concluded that several biosecurity measures such as an all-in/all-out system and compartmentation are implemented relatively well whereas other measures can easily be improved. These measures include: cleaning and disinfection of the barn, isolation of sick animals and measures for visitors. According to this study one of the reasons why these measures are not used as much as they should is because cattle farmers lack knowledge about the effects of biosecurity.

The Eveal program

In summary, the current use of antibiotics on Dutch veal farms is high due to the high burden of infectious diseases. At the same time, there are many possibilities to improve disease prevention by implementing biosecurity measures. However, there seems a lack of knowledge to achieve this improvement. Veterinarians from the Thewi veterinary practice initiated and

composed a set of online learning modules to educate veal farmers and their advisors to address this knowledge gap. Their final aim was to improve disease prevention and the early detection of sick animals.

The online training program, called Eveal, was developed in collaboration with Utrecht University and the Netherlands Agricultural and Horticultural Association. The program consists of eight modules. The modules subjects are respectively: '*the healthy calf*', '*visual sickness recognition*', '*airway problems*', '*digestion problems*', '*environment*', '*management*', '*most often occurring problems*' and '*practice case studies*'. Every module ends with a test which is passed with a score of 70% or higher. The program is live since 2018. As of now (January 2021) around 170 individuals have enrolled in one or more modules.

Change of behaviour and the COM-B framework

Evaluation can improve the Eveal program and reveal which components are the most effective or which are ineffective (Rovai, 2003). For evaluation of the Eveal program it is important to determine if change in behaviour after following the program has occurred. Likert scale based questions can be used to measure a certain change of behaviour.

There are several theoretical frameworks to explain and predict behavioural changes and one of them is the COM-B framework. In the COM-B framework capability, opportunity and motivation can all influence a behaviour and that behaviour can in turn influence the capability, opportunity and motivation (Michie et al, 2011; Saha & Promite, 2017). The capability represents an individual's capacity to execute the behaviour. The opportunity represents factors outside the individual that make the behaviour possible. Motivation is defined as 'all those brain processes that energize and direct behaviour, not just goals and conscious decision-making'. It includes habitual processes, emotional responding, as well as analytical decision-making (Michie et al, 2011).

Aim of the study

There is very little research published on behaviour of farmers to improve animal welfare and reduce the use of antibiotics on farms by means of an education program. The creators of the Eveal program would like to know if their learning program results in change of behaviour among the participants in relation to animal health on the farm, quicker sickness recognition, more preventative measures in the stables and a lower use of antibiotics.

The aim of this study was to evaluate the Eveal program using an online survey. The survey consisted of two parts: one to measure potential behavioural changes in participants after following the Eveal program and one part to measure changes in attitude toward antibiotics and number of antibiotics used after following the Eveal program.

Materials and Methods

The survey

The survey was distributed via e-mail to all 170 individuals that were enrolled in any of the Eveal modules. The survey started on January 21st 2021 and ended on February 19th 2021. When the survey was live, about halfway through, one reminder email was sent out to all participants in an effort to increase the response rate. The survey was composed with the program Qualtrics XM® and consisted of 24 questions. Before the actual start of the survey, all respondents had to agree to the declaration of consent approved by an ethical committee of

Utrecht University. In the first question, we asked whether the participant was working as a farmer or whether the participant was working in another role in the industry, such as feed advisor or veterinarian. Questions on farm management activities in the remaining part of the survey were presented to farmers only. In the following questions of the first section, we asked about the amount of working experience in years, the number of FTE working at the farm, the type of veal farm (white, rosé or both) and the number of modules followed.

The next section of the survey contained a total of 25 questions, scored on a 7 point Likert scale, all ranging from 1 = completely disagree to 7 = completely agree. They were used to measure 7 different behavioural changes and to measure the capability, opportunity and motivations of the participants to use in the COM-B framework.

Change of behaviour

We used the following 7 items to measure change of behaviour:

1. 'Change in attitude on preventive measures': This item used the Likert scale based question: *After following the Eveal program I think it's more important to take more preventative measures*.

2. 'More discussions': This item used the question: *After following the Eveal program I have more in-dept discussions (with veterinarian/educators)*. This question was only shown to the farmers.

3. 'Different look on animals': This item used the question: '*After following the Eveal program I look at my animals in a different way*'.

4. 'Intervene quicker': this last item used the question: *After following the Eveal program I intervene quicker when something is wrong with the animals*.

5. 'Change in preventive measures': This item was computed by adding up the mean of 7 Likert scale based questions. The questions were first analysed with a reliability analysis which resulted in a Cronbach's alpha of 0,909. This was deemed a very high correlation and therefore it was decided that these items could be combined into the new variable. The questions used for this item were:
   o *After following the Eveal program I spent more time and attention on cleaning and disinfection the stable.*
   o *After following the Eveal program I spent more time and attention on checking equipment in the stable.*
   o *After following the Eveal program I verified extra that stable temperature was not too cold.*
   o *After following the Eveal program I paid extra attention to the hygiene barrier in the stable was in order.*
   o *After following the Eveal program I checked the ventilation in the stable more often during a round.*
   o *After following the Eveal program I checked the temperature in the stable more often during a round.*
   o *After following the Eveal program I looked at the hygiene barrier in the stable more often during a round.*

6. 'Change in care': This item is composed by using the mean of three Likert scale based questions that all measured change in care of the animals. These three questions were also tested for reliability which resulted in a Cronbach's alpha of 0,845. This was considered a very high correlation and thus the new item was made with the following questions:
   - *After follwing the Eveal program I more often walk around in the stable to check on the animals.*
   - *After follwing the Eveal program I take better care of the animals.*
   - *After following the Eveal program I put more time in taking care of the animals.*

7. 'Change in antibiotics': The last item is made by combining the results of four Likert questions from the survey. These questions showed an Cronbach's alpha of 0,721 when tested for reliability. The questions used were:
   - *After following the Eveal program I am more reserved in using antibiotics.*
   - *After following the Eveal program I am more conscious in the amount of antibiotics I use.*
   - *After following the Eveal program I treat the calves more individually.*
   - *After following the Eveal program I think more about the different kinds of antibiotics I use.*

COM-B

In this study certain Likert questions were used in the survey to measure capability, opportunity and motivation. These three components could then be applied to measure behavioural change according to the COM-B framework. The following Likert scale based questions were used for each component:

1. *Capability:* The following three Likert were combined as the item 'Capability' after being tested with a reliability analysis with a Cronbach's alpha of 0,710.
   - *After following the Eveal program I know more about the different ways to prevent sickness.*
   - *After following the Eveal program I am more prepared to have discussions (with advisors/veterinarians).*
   - *After following the Eveal program I feel like I am more in control in the stable.*
2. *Opportunity:* Fort the item 'Opportunity' we used the Likert question: '*After following the Eveal program I think more about the ways other farmers succeed to keep their animals healthy*'.
3. *Motivation:* The two Likert questions for motivation were tested with a bivariate correlation with an outcome of 0,218 ($p > 0,05$). This correlation was deemed too low and therefore these two questions were left as two items: 'Motivation to intervene' and 'Motivation to take preventative measures'. The used Likert question:
   - *After following the Eveal program I am more motivated to intervene when necessary.*
   - *After following the Eveal program I think it is more self-evident to take preventative measures.*

Antibiotic use

We asked the farmers to report antibiotic use as either Defined Daily Dose Animal (DDDA) based on a reference calf in the last round, as DDDA on a reference calf in the last quarter of

the year, as DDDA based on information from the veterinarian or as number of group treatments in the last round. The information was analysed separately.

In addition, we asked the farmers how much so called second choice antibiotics they used in the last round. They were asked to quantify this use by providing the number of bottles and the number of group treatments.

Program satisfaction

Lastly, seven Likert scale based questions were asked to the participants to evaluate their satisfaction with the Eveal program. The questions were:

1. *'I would recommend the modules'*
2. *'I would like to follow more modules in the future'*
3. *'I applied information from the modules in practice'*
4. *'The modules did not take too much time'*
5. *'The modules were user friendly'*
6. *'I learned a lot from the modules'*
7. *'I am satisfied with the modules I followed'*

The seven items were then analysed for reliability and a Cronbach's alpha of 0,835 was found. This is a very high correlation and thus the items could be combined to create a new item named 'Program satisfaction'.

Data processing

The processing of data was done with the software SPSS. The data from the survey was edited in Microsoft Excel before it was imported into SPSS, including the removal of unfinished surveys and participants that did not agreed to the declaration of consent. Once in SPSS, questions were analysed separately according to their type of question. All categories with three or more Likert items were analysed with a reliability analysis for the Cronbach's alpha.

Linear regressions were made to find relations between capability, opportunity, motivation and behavioural change. The *capability*, *opportunity*, *motivation to intervene* and *motivation to take preventative measures* were used as independent variables and the seven different behavioural changes mentioned earlier were used as dependent variables. The linear regressions were done to see if behavioural change can be predicted by capability, opportunity and motivation.

For the questions on antibiotics all the unfilled answers were recorded as a zeros, these 'answers' would influence the mean of the question. Therefore the data was recoded in SPSS by removing the zero's which turned them into missing values. This means that the N varies between the four questions.

Results

Approximately 170 participants had so far followed one or more modules. Of the invited individuals 44 started and 35 completed the survey and agreed to the declaration of consent. This means that the response rate was 20,6%. The nine partial responses were not be included in further examination of the results.

From the 35 respondents, 27 (77%) stated that they were farmers and 8 respondents stated they had another function in the industry which is together with the years of experience, farm type and the number of modules they followed is presented in Table 1.

Table 1: Summary of the participants characteristics (N=35).

Variable	Frequency	%
Function in company		
Farmer	27	77,1
Other	8	22,9
Years of experience		
<5	7	20,0
5-10	11	31,4
10-20	8	22,9
>20	9	25,7
Veal farm type		
White	16	45,7
Rosé	13	37,1
Both	3	8,6
Unknown	3	8,6
Number of modules followed		
1	14	40,0
2	6	17,1
3	7	20,0
4	1	2,9
5	6	17,1
6	1	2,9

Change of behaviour

The participants scored a mean of 4,8 (*SD* of 1,2) on their 'Change in attitude towards preventive measures'. As this score is above the halfway point of the scale it seems that the Eveal program had a positive effect on the participant's attitude towards preventive measures, though not significantly proven. The results show a mean score of 4,6 (*SD* of 1,0) on 'Intervene quicker'. This means that the participants indicate that they agree they intervene quicker when something is wrong with the animals, as this score is also over the halfway point of the scale. As the item 'Different look on animals' scored above the midway point of the scale as well, with a mean score of 4,8 (*SD* of 1,2), the result suggest that the way the respondents look at the animals changed.

The item 'Change in preventive measures' scored a mean of 3,9 (*SD* of 1,1), which is below the halfway point of the scale and indicates that following the Eveal program did not result in the implementation of preventive measures by the participants. Similar, it appears that participants did not change their behaviour towards their care for the animals as the item was scored with 3,4 (*SD* of 1,1).
With a mean score of 4.3 on 'More discussions' (*SD* of 1,4), the results show an almost neutral outcome as it is close to the halfway point of the scale. This means that the participants do not agree on a change in motivation to have more discussions with a veterinarian/advisor but also do not disagree with it. The item 'Change in antibiotics' had a mean of 4,1 (*SD* of 0,99) which is even closer to the midway point of the scale. This suggest

that the participants have a neutral perspective on their behaviour change towards the use of antibiotics.

COM-B

We found that the a higher score for the independent behavioural change items (*capability*, *opportunity*, *motivation to intervene* and *motivation to take preventive measures)* were associated with a significant increase on the item 'More discussions' ($F_{(4,22)} = 5,91$, $p = 0,02$). The adjusted R square was 0,430 which means that the willingness of participants to have more discussions is for 43% explained by their capabilities, opportunities and motivations.

Other associations were not significant, although the effect on the item 'Different look on animals' had adjusted R square of 0,303 that gave an almost significant increase ($F_{(4,22)} = 2,39$, $p = 0,08$).

Antibiotics

Out of the 27 farmers, only 11 filled in all four options to quantify their recent antibiotic use. The other farmers filled in either one, two or three options. The result are shown in table 2.

Table 2: Quantification of the recent antibiotic use on the participating veal farms.

Variable	N	Min.	Max.	Mean	SD
DDDA last round based on information calf	15	3,1	68,9	20,9	15,5
DDDA last quarter based on information calf	14	3,0	82,8	24,5	25,8
DDDA based on information veterinarian	11	3,1	69,0	21,8	17,4
Group treatments last round	17	2,0	5,0	3,6	0,8

Figure 1 shows that the reported mean DDDA for antibiotic use of the white veal farms in this study (17.1) are similar to the mean national DDDA for white veal farms reported by the SDa (17.4). There is a lot of variation in DDDA of rose veal farms in this study, but this variation is also found between different veal farm types in the national data reported by the SDa.
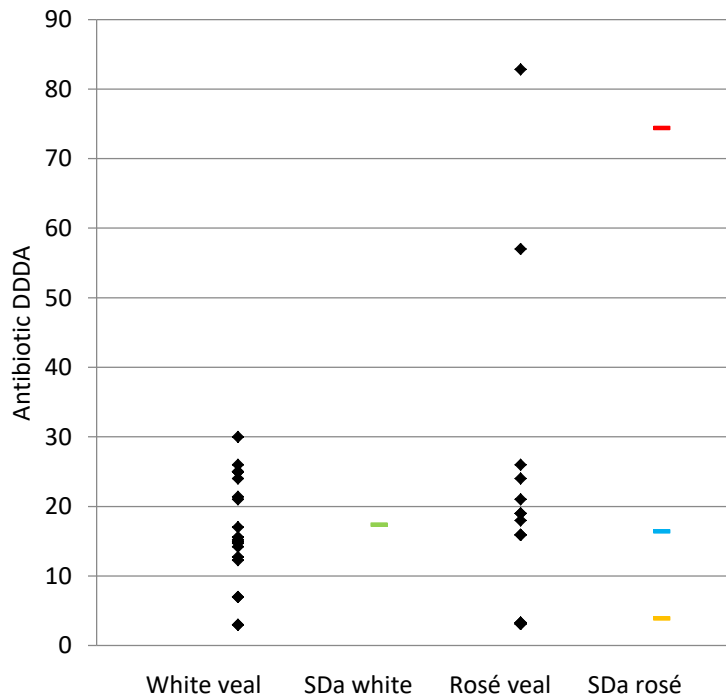
Fig. 1: Dotplot of the quantified antibiotic DDDA of the veal farms according to the respondents type compared to the mean DDDA reported by the SDa in 2019. The SDA divides rose veal farms into rose start veal (red in figure, mean DDDA of 74,4), rose fattening veal (blue in figure, mean DDDA of 16,4) and rose combination veal (orange in figure, mean DDDA of 3,9).

Out of the 27 farmers, 26 filled in the amount of bottles used. All 27 filled in the group treatments given. They were also asked whether they had begun with the Eveal modules before the start of the last round. 21 participants had started the modules before this last round. During the last round, the mean number of bottles with so-called second choice antibiotics on the farms was 2,8 (N=26) and the number of group treatments was 0,07 (N=27).

Program satisfaction

The appraisal of the Eveal modules is shown in figure 2. As the combined variable 'Program satisfaction' had a mean score of 5,6 (*SD* of 0,7) the participants seem satisfied with their experience of following the Eveal modules.

While all individual characteristics of the modules were appreciated by the respondents, the participants were least positive about the length of the modules as it had a mean score of 5.3 (*SD* of 1.3) and most positive about the item '*I applied information from the modules in practice*' mean score 5.9 (*SD* of 0.7)
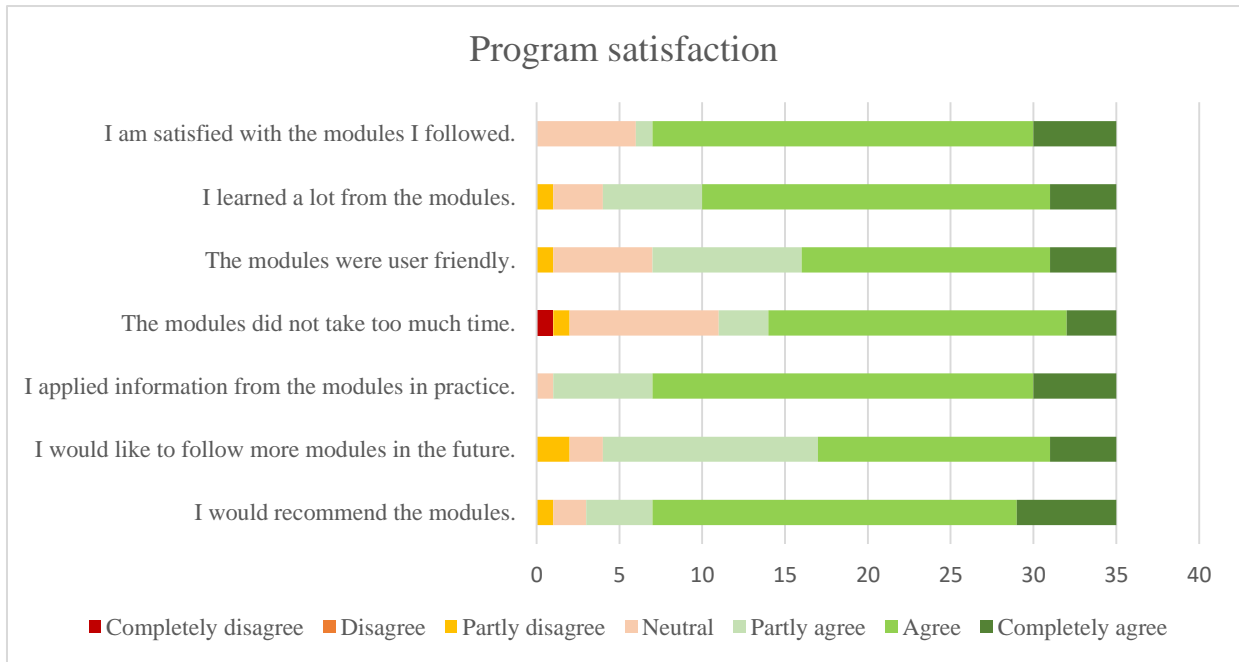
Figure 2: Stacked bar chart of program satisfaction results (N=35).

Discussion

This study used a survey to evaluate the Eveal program. The survey response rate was 20,6%. This response rate was achieved with a reminder notification halfway through the response period and the chance to win a free Eveal module after finishing the survey. Multiple studies have shown that a reminder notification has a positive effect on response rates in email surveys (Kaplowitz et al, 2004; Fox et al, 1988). Research on emailed surveys also demonstrates that response rates benefit significantly with a lottery at the end (Heerwegh, 2006).

The response rate seems reasonable when compared to other survey studies on Dutch farmers which varied form 13,4% (Robbers et al, 2021) to 31,75% (Derks et al, 2012) and 57% (Bergevoet et al, 2004). When compared to the study of Pennings et al (2002) on surveying farmers in general, our response rate seems to be on the low side as they found an average response rate of 28% for a four week surveying period.

When evaluating the group of respondents (table 1) there seems to be a diverse group regarding their years of experience in the veal industry. The type of farm is divided as well. This means the participants of the survey seem to represent a variety of participants of the program in total.

Multiple behaviour changes were found in the results, although not significantly proven. Four out of seven measured components did not show a change of behaviour as they scored below the halfway point of the scale or very close to the halfway point. A possible explanation for the components that did not show a change in behaviour is that 40% of the participants only followed the first module (see table 1). The first module is called '*the healthy calf*' and is about anatomy of veal calves. The modules does not yet discuss preventive measures or antibiotic use and could therefore be a reason why no behavioural change was found.

Remarkable is the fact that 'change in attitude towards preventive measures' did seem to result in a behaviour change after the program but 'change in preventive measures' did not. It seems that the program results in different way of thinking about preventive measures but does not yet result in actually changing the preventive measures in the stable. Similar we see that the participants indicate they look at the animals in a different way after participating in the Eveal program but they did not change the way they care for the animals. The intentions to change seem to be there but the execution is missing. In further research intentions and behaviours could be measured and possibly explained with the theory of planned behaviour (Ajzen, 2001).

The COM-B model resulted in a significant association between capability, opportunity and motivation with the behavioural change 'More discussion'. This means that the farmers take on more in-dept discussions with advisors/veterinarians after participating in the program and that this change is influenced by their capability, the opportunity and their motivations.

The remaining changes of behaviour did not result in a significant association in the COM-B model. It can therefore be concluded that capability, opportunity and motivations did not play a significant role in the change of behaviour found in this study. In order to find out what does explain the behaviour changes, further research of other frameworks can be done, such as the theory of planned behaviour or the theory of reasoned action (Madden et al, 1992).

We used four different quantifications of antibiotics use as we were concerned that farmers would not all have the same quantification parameter at their disposal and might not be able to transform them into another one. This means that our variables are not measured the same way as the numbers handled by the SDa and can therefore not be compared correctly. The reported results now only give a general idea on how our measured numbers compare to the

national numbers. Also the SDa report made a distinction between the different kinds of veal farms in more groups than this study asked about in the survey. This was a hindrance as well when comparing numbers. As was seen in figure 1 there was a wide distribution among the rose veal farm DDDA's. This could be explained by the fact that we did not distinguish between different kinds of rose farms. Overall we see that reduction of antibiotics numbers was not found. This is in agreement with the fact no behaviour change in 'change in antibiotics' was found.

The benefit of a quantitative approach is that smaller subdivisions can be made within the observations which makes the testing and reproducing of the hypothesis easier, also with regard to relationships among variables (Almalki, 2016). Most questions in the survey were seven point Likert scale questions. Respondents had to indicate their level disagreement or agreement on each Likert item. The scale went from completely disagree (1) to completely agree (7) (Barua, 2013).
The Likert scale was chosen for the low difficulty in answering for the respondents. We selected a scale with a neutral answer possibility because research of Chyung et al (2017) states that respondents who are familiar with the subject of the survey should be allowed to express a neutral opinion. The 7-point scale opposed to the 5-point scale was chosen for the advantage of measuring more nuanced answers. The 7-point scale makes the adjacent option less radically different and gives a more gradual transition (Joshi et al, 2015).

Conclusions

This study evaluates the Eveal program by exploring whether behavioural change occurs after participating in the program. It also tested these changes with the existing COM-B model to provide a foundation and understanding for these behaviour changes.
Possible behaviour changes after following the Eveal program have been found in the 'change in attitude towards preventive measures', 'intervening quicker' when something is wrong with the animals and a 'different look on the animals', as they all scored over the halfway point of the Likert scale. Unfortunately most behaviour changes were not supported by the COM-B framework. There was only an association found in 'increase in discussions with veterinarians or advisors' with the capability, opportunity and motivation. This means when the capability, opportunity and motivation of participants increase so does their participation in more discussions with veterinarian or advisors. This also means that other behaviour changes did not increase when capability, opportunity and motivation increase. In conclusion the COM-B framework could not predict the behaviour changes in the participants of this study. Further research could be done with other theoretical frameworks, such as the theory of planned behaviour, to find a possible explanation for the behaviour changes.

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