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Artículo original

Should we stop vaccinating against foot-and-mouth disease in Uruguay? A national survey of veterinarians

¿Debemos dejar de vacunar contra Fiebre Aftosa en Uruguay? Una encuesta nacional a veterinarios

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Abstract

Veterinarians' opinions are key to successfully implementing disease control programs. Foot-and-mouth disease (FMD) has a significant economic impact due to animal production losses and trade restrictions. In 2010, PANAFTOSA defined a roadmap to FMD eradication in South America. Although Uruguay has implemented this plan by using mandatory vaccination since the last outbreak in 2001, vaccination restricts access to premium export markets. The objective of this study was to determine the perception of veterinarians involved in large animal disease control programs (accredited veterinarians) on a future FMD control stage without vaccination in Uruguay. Two hundred and fifty-six accredited veterinarians were surveyed between August and September 2018. Two strata were defined as follows: Stratum 1 (pre-FMD outbreak), veterinarians who enrolled in the University of the Republic in Uruguay before or in 2001 (N=708), and Stratum 2 (post-FMD outbreak) veterinarians who enrolled after 2001 (N=426). Data related to demographics, vaccination perceptions, and FMD-related experiences were collected through online and phone interviews. Logistic regressions were used to determine the association between demographic variables, FMD-related risk perceptions, and the willingness to stop FMD vaccination. 41.7% (± 4.2) and 29.4% (± 4.2) of veterinarians, for strata 1 or 2, respectively, were willing to stop vaccination. Veterinarians' geographical region of work influenced this perception. The northeast area being more likely to support stopping vaccination (46.3 ± 5.8%) when compared to the South-center (39.2 ± 4.9%) and West (25.3 ± 5.0%). Accredited veterinarians are still hesitant to stop vaccination, presenting problems when implementing a non-vaccination stage.
Keywords: Foot-and-mouth disease, Survey, Vaccination, Uruguay.

Resumen

Las opiniones de los veterinarios son clave para implementar con éxito los programas de control de enfermedades. La fiebre aftosa (FA) tiene un impacto económico significativo debido a las pérdidas de producción animal y las restricciones comerciales. En 2010, PANAFTOSA definió un Plan para la erradicación de FA en América del Sur. Aunque Uruguay ha implementado este plan mediante el uso de la vacunación obligatoria desde el último brote en 2001, la vacunación restringe el acceso a los mercados de exportación. El objetivo de este estudio fue determinar la percepción de los veterinarios involucrados en grandes programas de control de enfermedades animales (veterinarios acreditados) sobre una futura etapa de fiebre aftosa sin vacunación en Uruguay. Se encuestó a 256 veterinarios acreditados entre agosto y septiembre de 2018. Se definieron dos estratos de la siguiente manera: Estrato 1 (pre-brote de fiebre aftosa), veterinarios ingresados a UdelaR en Uruguay antes o en 2001 (N = 708) y veterinarios del Estrato 2 (después del brote de fiebre aftosa) que ingresaron luego 2001 (N = 426). Los datos relacionados con la demografía, las percepciones de vacunación y las experiencias relacionadas con la fiebre aftosa se recopilaron a través de entrevistas telefónicas y en línea. Se utilizaron regresiones logísticas para determinar la asociación entre las variables demográficas, las percepciones del riesgo relacionado con la fiebre aftosa y la voluntad de suspender la vacunación contra la fiebre aftosa. El 41,7% (± 4,2) y el 29,4% (± 4,2) de los veterinarios, para los estratos 1 o 2, respectivamente, estaban dispuestos a suspender la vacunación. La región geográfica de trabajo de los veterinarios influyó en esta percepción. Es más probable que el área noreste apoye la interrupción de la vacunación (46,3 ± 5,8%) en comparación con el centro sur (39,2 ± 4,9%) y el oeste (25,3 ± 5,0%). Los veterinarios acreditados aún dudan en suspender la vacunación, presentando problemas a la hora de implementar una etapa de no vacunación.
Palabras clave: Fiebre aftosa, Encuesta, Vacunación, Uruguay.

Introduction

Foot-and-mouth disease (FMD) is a highly contagious viral disease of livestock caused by an *Aphftovirus* affecting cattle, swine, sheep, goats, and other cloven-hoofed ruminants. It is characterized by fever and blister-like sores on the mouth, teats, and between the hooves (Blood et al., 2002). FMD has a large economic impact on animal production (Casas Olascoaga et al., 1999; Knight-Jones & Rushton, 2013), with costs not only limited to direct losses but mainly associated with indirect costs on control strategies and access to high price exporting markets (MGAP, 2019).

Uruguay's FMD outbreaks in 2000 and 2001 shook the Uruguayan livestock sector with losses of more than 700 million USD (Antunez, 2019, May 22). Veterinarians play a key role in the early detection and disease control strategies, aiding in reducing the economic impact. Suspected clinical cases must be reported to the National Animal Health Services who will visit the farm and carry out a comprehensive epidemiological study. Thus, veterinarian's perception on FMD control strategies may have a role on early disease detection on the field.

There are seven strains (A, O, C, SAT1, SAT2, SAT3, and Asia 1) which are endemic in different countries worldwide, but in this century, for Uruguay only strains "A" and "O" are relevant. The strains present in a particular region must be taken into account for defining vaccination strategies, and vaccine composition. Also, depending on the country and epidemiology situation, not all susceptible animals should be vaccinated. For example, in Uruguay, only cattle are vaccinated while other species remain susceptible to the virus (COSALFA, 2019; Paton et al., 2018). These vaccination characteristics might impact veterinarian's perception on the effectiveness of control strategies.

Argentina and Brazil, Uruguay's bordering countries, have reported their last FMD cases in 2006, and according to World Organization for Animal Health (OIE), they have free zones with vaccination and free zones without vaccination. Similarly, the idea is that territories in South America would move from FMD-free with vaccination to FMD-free without vaccination, as evidence of the total eradication of FMD (PHEFA, 2020). This process is one of the specific objectives of the Action Plan 2021-2025 of the Hemispheric Plan for the Eradication of FMD (PHEFA). For Uruguay, this transition might indicate a significant increase in exports prices, and eliminate costs related to vaccination, which were 12 million USD in 2020 (Uruguay, 2019 November 19).

Knowledge on the perception and opinions of veterinarians on large animal disease control programs would help with the discussion of suspending FMD vaccination and the advance towards a new stage of PHEFA. Therefore, our objective was to determine the perception of veterinarians involved in disease control programs (accredited veterinarians) on a future FMD control stage without vaccination in Uruguay.

Materials and methods

Description of the study population

The target population of this survey were veterinarians working in Uruguay who are accredited by the Ministry of Livestock, Agriculture and Fisheries to participate in disease control programs in large animals. The sampling frame of this study was obtained through collaborations with the Ministry of Livestock, Agriculture and Fisheries, who provided a list of all veterinarians accredited as of June 2018. Two strata were determined based on the year of admission to the only Faculty of Veterinary Medicine in Uruguay: "Stratum 1" (pre-FMD outbreak) consisted of veterinarians admitted before or in 2001 and "Stratum 2" (post-FMD outbreak) consisted of veterinarians admitted after 2001. These strata were established in order to investigate whether the fact of having been trained in the veterinary profession in a country with or without FMD, influenced the perception of veterinarians about FMD control practices. The total number of veterinarians in the population was 1134, 708 (Stratum 1) and 426 (Stratum 2).

Sample size

The sample size calculations were performed in order to estimate the true proportion of individuals willing to stop FMD vaccination. Based on previous results (Piaggio et al., April, 2016), this proportion was 23%. Considering a precision of 5%, a confidence level of 95%, and a population of 1134 veterinarians, a sample size of 273 (n=220 adjusted for population size). A stratified random sample strategy was used and to accomplish with the minimum sample size estimated by each Stratum of 110 veterinarians. To take in consideration rejection to participate, 162 veterinarians were randomly selected on each Stratum.

Survey design

The survey consisted of 3 sections: 1) demographic and professional information, 2) 10 closed questions regarding the perception on FMD risk, and opinion of the control and eradication measures applied in Uruguay, and 3) specific questions about vaccination and the cost/benefit of an eventual suspension of vaccination (Annexed 1). Uruguay was divided into three regions (West, Northeast and Center-South) due to geographical characteristics and production systems, the areas are presented in Fig. 1.

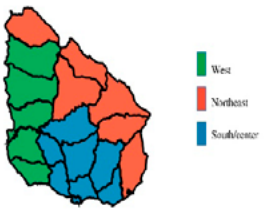

Figure 1: Distribution of departments by area of Uruguay

The questionnaire and their possible answers are depicted in Annexed 1. During the questionnaire design stage, a test form was used and the survey was carried out with 10 professors at the Faculty of Veterinary Medicine to assess the quality of the tool. This test form was distributed by email to this test group and the disagreements were discussed between the researchers.

Survey delivery

To carry out the survey, an electronic form was used on Google Forms platform. From August 6th to September 30th of 2018, the link was distributed via e-mail to the Veterinarians selected in the sample. Follow-up emails were sent 6 times. Those veterinarians who did not reply to the email, were contacted via telephone up to 3 times before being considered as non-responders.

Statistical analysis

The stratified study design was accounted by using the relative weight of the individuals in each Stratum using Stata version 12 (College Station, USA) stratified analysis. The probability of selection of an individual was 162/708 and 162/426 for strata 1 and 2, respectively. The inverse of the selection probability was used to weight each individual in the total data analysis. The data were analyzed descriptively for each question, and a logistic regression was used to determine the association between questionnaire variables and willingness to stop vaccination.

The yes category from willingness to stop vaccination was divided in two parts, yes with no conditions, and yes under certain circumstances (which were described descriptively). For the logistic regression, however, the willingness to stop vaccination was restricted to yes vs. no. A univariate logistic regression analysis was used to evaluate the association between demographic and FMD-risk-related questions with willingness to stop FMD vaccination (no vs. yes). Those that indicated not to have an opinion were excluded from the analysis. Those variables that presented a *P-value* lower than 0.20, and their first term interactions were selected for a multivariable model. The selection of the multivariable model was carried out by means of a backward elimination using a cut-off *P-value* of 0.05. The final model was determined when all the variables that remained in the model were significant at a *P-value* less than 0.05.

Results and discussion

Data and scope of the survey

Of the total 324 veterinarians randomly selected for participation in the survey, 256 actually responded the survey (79% response rate). Of the 256 veterinarians that agreed to participate: 48.8% (n_1= 125) were from Stratum 1 (pre-FMD outbreak), and 51.2% (n_2=129) were from Stratum 2 (post-FMD outbreak). The total percentage of non-response was 20.9% (22.8% and 19.1% first and second stratum, respectively).

Sample description

Descriptive statistics relating to the surveyed individuals and their responses are depicted in Table 1. The mean year of starting to study in the Faculty of Veterinary Medicine was 1991 in Stratum 1 and 2007 in Stratum 2. Most veterinarians, in both strata, reported working with beef (Table 1). However, most of them (61%), worked on more than one animal species, with 21% only working with beef cattle.

Table 1

Descriptive means/percentage (SD) from the two strata defined in our population

Variable	Stratum 1[a]	Stratum 2[b]
N	127	129
Years in veterinary school	9.02 (0.22)	8.19 (0.12)
Work area (%)[c]		
Beef production	84.25 (3.2)	80.62 (3.5)
Dairy production	29.92 (4.1)	30.24 (4.0)
Ovine production	37.79 (4.3)	51.2 (4.4)
Other	37.0 (4.3)	37.9 (4.3)
No answer	0	0.7 (0.7)
Number of farms (%)[d]		
0	13.38 (3.0)	10.85 (2.7)
1 to 5	27.56 (4.0)	41.86 (4.4)
6 to 10	24.40 (3.8)	22.48 (3.7)
More than 10	32.28 (4.2)	20.93 (3.6)
No answer	2.4 (1.3)	3.87 (1.7)

[a] Veterinarians who enrolled in the Faculty of Veterinary Medicine before or in 2001 (pre-FMD outbreak).

[b] Veterinarians who enrolled in the Faculty of Veterinary Medicine after 2001 (post-FMD outbreak).

[c] Veterinarians can work on more than one area.

[d] Number of farms where the veterinarian works.

Description of the opinion of accredited veterinarians regarding disease control programs on FMD

Veterinarians' answers regarding FMD risk perceptions are depicted on Table 2 and Fig. 2. Of all surveyed veterinarians only 32.2% had been exposed to FMD in the field (Table 2). In Stratum 1, most veterinarians would score themselves and other veterinarians as a 3 or 4 out of 4 (higher) in their capabilities of diagnosing an FMD clinical case (Fig. 2). However, when asked about other veterinarian's capabilities, these scores were primarily 2 and 3 out of 4 (Fig. 2). Similar results were observed on Stratum 2 veterinarians (Fig. 2). Most veterinarians on both strata considered there was a low or moderate risk of introduction of FMD in Uruguay (Fig. 2). However, when answering regarding the eradication plan in the region, the most common answer was

"no answer" 41.3% (Fig. 2). Most veterinarians (>80% in each Stratum) indicated that vaccination was the most important measure to prevent FMD in Uruguay (Fig. 2). Conversely, more than 50% of veterinarians in each Stratum saw the cost/benefit ratio of stopping vaccination as neutral or inadequate (Fig. 2).

Opinions regarding stopping FMD vaccination—multivariable logistic regression

The results from the unconditional associations are depicted in Annexed 2. The probability of being inclined to stop vaccination was 41.7% (n=52) on Stratum 1 and 29.4% (n=38) on Stratum 2, after adjusting for region and the perception of the risk of introduction (Table 3). The region with the highest observed probability of being inclined to stop vaccination was the "Northeast" region (46.3%), followed by "Central-South" (39.2%), and the "West" region (25.3%) (Table 3).

While adjusting for strata and geographic area, veterinarians who considered the risk of reintroduction of the disease in Uruguay was "low," had a higher probability of being willing to stop vaccination than those in the moderate and high groups (Table 3).

When looking at the conditions under which veterinarians would be more likely to suspend vaccination, the most common circumstances were: larger epidemiological surveillance (63.2%), border controls (61.8%), and a better regional situation (59.2%) (Table 4).

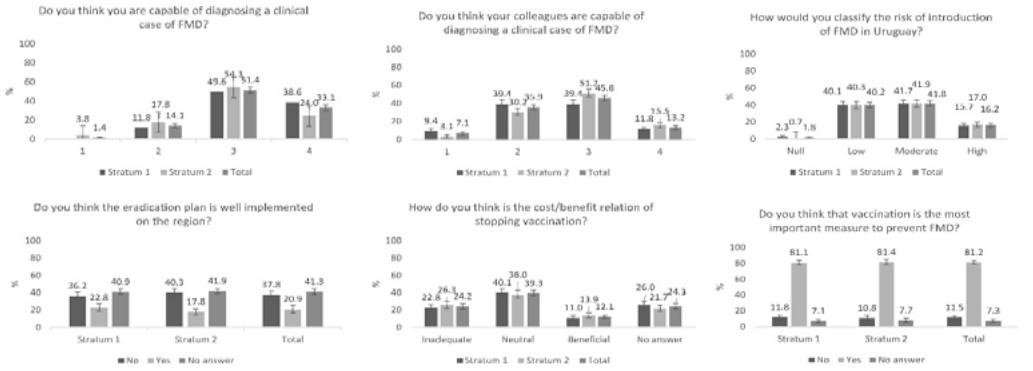

Figure 2: Percentage and SE of answers to FMD related questions from a survey of 256 veterinarians regarding FMD control measures, adjusted for sampling strategy. 1 = minimum and 4 = maximum

Table 2

Percentage and SE of answers to FMD related questions from a survey of 256 veterinarians regarding FMD control measures, adjusted for sampling strategy

Variable	Stratum 1[a]	Stratum 2[b]	Total
Did you see a clinical case?			
Yes	45.7 (4.4)	10.1 (4.8)	32.2 (3.1)
In your professional activity do you consider a possible reintroduction of FMD to the country as a concern?			
No	37.8 (4.3)	27.1 (3.9)	33.8 (3.1)
Yes	61.4 (4.3)	70.5 (4.0)	64.8 (3.1)
No answer	0.7 (0.8)	2.3 (1.3)	1.4 (0.7)
Given the current circumstances, do you think that FMD vaccination should be stopped?			
No	51.2 (4.4)	60.5 (4.3)	54.6 (3.2)
Yes	1.5 (1.1)	-	1.0 (0.7)
Yes, under certain circumstances	37.0 (4.3)	22.5 (3.7)	31.6 (3.0)
I don´t have an opinion	10.2 (2.7)	17.0 (3.3)	12.8 (2.1)

[a] Veterinarians who enrolled in the Faculty of Veterinary Medicine before or in 2001 (pre-FMD outbreak).

[b] Veterinarians who enrolled in the Faculty of Veterinary Medicine after 2001 (post-FMD outbreak).

Table 3

Multivariable analysis of willingness to stopping vaccination for FMD in Uruguay among accredited veterinarians

Variable	Probability of "Yes" (SEM)	*P*- value
Stratum		0.04
1[a]	41.7 (4.2)	
2[b]	29.4 (4.0)	
Region		0.02
West	25.3 (5.0)	
Northeast	46.3 (5.8)	
South-center	39.2 (4.9)	
How do you classify the risk of FMD introduction?		<0.01
Low	58.8 (5.4)	
Moderate	29.8 (4.9)	
High	7.5 (4.2)	

[a] Veterinarians who enrolled in the Faculty of Veterinary Medicine before or in 2001 (pre-FMD outbreak).

[b] Veterinarians who enrolled in the Faculty of Veterinary Medicine after 2001 (post-FMD outbreak).

Discussion

This study is the second study to understand the opinion of accredited veterinarians on vaccination implementation strategies in Uruguay. With 29.4% to 41.7% of the accredited veterinarians being in agreement to stop FMD vaccination under certain circumstances, depending on the Stratum in which they were included, there are still challenges to support stopping vaccination as outlined in the PHEFA.

Our study presented a high response rate (79%), which was comparable to Piaggio's study (Piaggio et al., April, 2016). This high response rate may be due to the survey delivery method (email and telephone), survey length (short survey), and the generally strong interest in FMD control strategies. Another investigation with similar characteristics to our work obtained a response rate of 31.6% (Caffarena et al., 2018). However, they only used an electronic form, without any other form of follow-up (phone) to contact the non-respondent veterinarians. Our response rate is comparable with that reported by others (Fincham, 2008), who established 70% as the lower limit for response rates on multimodal survey approaches.

The surveyed veterinarians mostly placed their and their colleague's capability of diagnosing a clinical case of FMD at the highest levels of the scale in the survey. Although there was a slight difference between veterinarian´s self-assessment and their assessment of their colleagues, this difference can be attributed to cultural traditions. Their capacity to clinically diagnose a case is of great importance considering that these veterinarians are in the first line to detect the disease, and a rapid control of a potential FMD introduction will depend on their clinical capacity. This result is comparable to that obtained by others (Piaggio

Table 4

Conditions mentioned by the 76 veterinarians who replied that they would be willing to stop FMD vaccination if certain conditions were met

Conditions [a]	Count	Percentage
Larger epidemiological surveillance	48	63.2
Border controls	47	61.8
Better regional situation	45	59.2
Better regional transparency	37	48.7
Contingency plan	31	40.8
Other (Not specified)	24	31.6
Total	76	100

[a] Veterinarians could pick more than one

et al., April, 2016), who reported that 64% of their respondents believe that veterinarians are prepared to recognize a clinical case of FMD.

The perception of risk of introduction of FMD in Uruguay in this study is comparable to that obtained by Piaggio's study (Piaggio et al., April, 2016), which is important given that veterinarians might consider FMD among potential differential diagnosis. Interestingly, even though their perception of risk is close to 40%, more than 60% reported to be concerned of a potential introduction, which might indicate a conservative approach to risk perception.

Although opinions regarding stopping vaccination varied by strata, 41.3% of all veterinarians did not answer whether the eradication/control plan is being carried out correctly in the region. This result could indicate that there is little knowledge about the government's perspectives and projections of FMD in the region. Given that a high percentage of veterinarians still think that the risk of introduction is moderate, these results on veterinarian's awareness on regional eradication plans are key in future communication campaigns regarding the disease control efforts. Public awareness and trust in government efforts will be fundamental when facing off the use of vaccines.

Similarly, most veterinarians (>80% in each Stratum) indicated that vaccination was the most important measure to prevent FMD in Uruguay. These results were supported by more than 50% of veterinarians in each Stratum indicating that the cost/benefit of stopping vaccination was neutral or inadequate. The fact that most veterinarians see this ratio as inadequate or neutral might indicate a lack of knowledge on the economic advantages of stopping routine FMD vaccination.

Veterinarians in Stratum 1 had higher probability to be inclined to suspend FMD vaccination than those in Stratum 2. This difference could potentially be explained due to Stratum 1 veterinarians having experienced different FMD control stages (outbreaks, free with vaccination, and free without vaccination). Our results related to willingness to stop vaccination were similar to that obtained by others (Piaggio et al., April, 2016), who reported that 23% of their respondents would be willing to stop vaccination. The study population of Piaggio (April, 2016) only included "post-FMD outbreak" veterinarians (our Stratum 2). Therefore, we can indicate two things, first that veterinarians "post-FMD outbreak" have been consistent in their willingness to stop vaccination, and that their intention is lower than that of veterinarians from Stratum 1.

The highest probability of being inclined to suspend vaccination (46.3%) was found in the Northeast region, which could be explained by the area without vaccination in the states of Rio Grande do Sul and Santa Catarina. This area might act "sentinel" zone (Baigorria, 2012), and provide veterinarians with a certain perceived protection. The West region reported the lowest probability of being inclined to suspend vaccination (25.3%), which could be related to the area in which the last FMD cases were introduced in 2001.

Although our study sampling strategy had the advantage of using a national registry for accredited veterinarians as a sampling frame, this does not include those non-accredited veterinarians. National surveillance activities comprise a large source of revenue to livestock veterinarians, and most veterinarians would be registered as accredited veterinarians in order to access that source of income. Thus, we did not consider this to be a large source of selection bias. Although there was a high response rate, no evaluation of demographic characteristics by respondents and non-respondents was carried out, which could have helped to identify potential selection bias.

Conclusion

Veterinarians who enrolled in the Faculty Veterinary Medicine before or in 2001 (Stratum 1) were more likely to be willing to suspend vaccination than those in Stratum 2. The area of residence and professional activity was associated with different opinions towards vaccination. These results highlight the perception of veterinarians regarding FMD control practices in Uruguay. Although large efforts have been put in place to eradicate and prevent FMD outbreaks, Uruguay's veterinarians still rely on the use of vaccination to control FMD. The knowledge produced through this survey will aid on the decision making process of the official veterinary services on future FMD control programs.

Conflicts of interest statement

None of the authors has any financial or personal relationships that could inappropriately influence or bias the context of the paper.

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References

Antunez, P. (2019, may 22). Stop vaccinating? FMD left a loss of 700 million dollars. “El Pais” newspaper, rural supplement. *El País, Rural Supplement*. Retrieved from https://rurales.elpais.com.uy/rurales-el-suplemento/dejar-de-vacunar-epidemia-genero-un-costo-global-de-us-700-millones#:~:text=La%20%C3%BAltima%20epidemia%20que%20sacudi%C3%B3,se%20cuele%20y%20haga%20estragos

Baigorria, L. (2012). *Estudio de los caracteres que pueden influir en el reingreso del virus aftósico al país, con énfasis en la frontera norte, departamento de Rivera* (Thesis). Faculty of Veterinary Medicine, University of the Republic, Montevideo.

Blood, D., Gay, C., Hinchcliff, K., & Radostits, O. (2002). *Medicina veterinaria : tratado de las enfermedades del ganado bovino, ovino, porcino, caprino y equino* (9ª ed., 2 Vol.). Madrid: McGraw-Hill Interamericana.

Caffarena, R. D., Riet-correa, F., & Giannitti, F. (2018). Use of pain managments practices during debotting and dehorning of dairy calves: a pilot study in Uruguay and Argentina. *Veterinaria (Montevideo)*, 54(210), 22–26. doi: 10.29155/vet.54.210.4

Casas Olascoaga, R., Astudillo, V., Magallanes, N., Mello, P., & Rosenberg, F. (1999). *Fiebre Aftosa*. Sao Paulo: Editorial Atheneu.

COSALFA. (2019). *Technical Note Hemispheric Program for the Eradication of Foot-and-Mouth Disease-Phefa Beyond 2020*. Retrieved from https://iris.paho.org/handle/10665.2/51363

Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the Journal. *American Journal of Pharmaceutical Education*, 72(2), 43. doi: 10.5688/aj720243.

Knight-Jones, T. J. D., & Rushton, J. (2013). The economic impacts of foot and mouth disease - What are they, how big are they and where do they occur? *Preventive Veterinary Medicine*, 112(3–4), 161–173. doi: 10.1016/j.prevetmed.2013.07.013

MGAP. (2019). *Situación de la Fiebre Aftosa y metas para el avance hacia el estatus de país libre sin vacunación* Retrieved from https://www.gub.uy/ministerio-ganaderia-agricultura-pesca/sites/ministerio-ganaderia-agricultura-pesca/files/documentos/publicaciones/acta_246_08_04_2019_situac_fa_metas_en_uruguay.pdf

Paton, D. J., Gubbins, S., & King, D. P. (2018). Understanding the transmission of foot-and-mouth disease virus at different scales. *Current Opinion in Virology*, 28, 85–91. doi: 0.1016/j.coviro.2017.11.013

PHEFA. (2020). *Action Plan PHEFA 2021-2025. Hemispheric Program for the eradication of Foot-and-Mouth Disease.* Retrieved from https://www.paho.org/en/documents/action-plan-phefa-2021-2025

Piaggio, J., Baruch, J., Díaz, M., Garcén, M., Gibernau, S., Von Gehlen, A., …Gil, A. (April, 2016). Percepction and opinions of generations of veterinarians trained in a FMD free country. En *43º International Conference Pre-COSALFA*, *Guía Técnica para la Transición de Estatus Sanitario de Fiebre Aftosa en Sudamérica: metodologías para su implementación, COSALFA,* Punta del Este.

Uruguay. (2019, November 19). Resolution N° 645/019: Adjudicación de licitación pública internacional n° 07/19. Adquisicion de vacunas contra la fiebre aftosa. Retrieved from https://www.impo.com.uy/bases/resoluciones/645-2019

Notes of contribution:

1. Design of the study, 2.Data collection, 3. Analysis of data, 4. Discussion of results, 5.Writing of manuscript, 6. Revision of manuscript.

Mara Olmos has contributed in 3, 4 and 5. Julio Olascoaga has contributed in 1, 2 and 6. José Piaggio has contributed in 1, 3, 4 and 6. Andrés Gil. Joaquin Baruch has contributed in 1, 3, 4 and 6.

Nota del editor:

La editora Cecilia Cajarville aprobó este artículo.

Annexed 1

Description of the form used in the survey. The questions were asked in this order

Questions	Possible answers
Name and Surname	
Telephone number	
Year of admission to Faculty of Veterinary Medicine	Year
Year of graduation from Faculty of Veterinary Medicine	Year
In which department do you carry out your main professional activity?	Department list
What type of production system do you work with?	Beef cattle/dairy cattle/sheep/others
In general, how many farms do you work with by month?	0/1 to 6/6 to 10/more than 10/no answer
Did you see any clinical case of FMD?	Yes/No
Do you think you are capable of diagnosing a clinical case of FMD?	Scale 1 to 4. 1=no capable, 4=very capable
Do you think your colleagues are capable of diagnosing a clinical case of FMD?	Scale 1 to 4. 1=no capable, 4=very capable
In your professional activity do you consider a possible reintroduction of FMD to the country as a concern?	Yes/No/No answer
How would you classify the risk of reintroduction of FMD?	Low/Moderate/High
Given de current circumstances, do you think that FMD vaccination should be stopped?	Yes/Yes, with better border controls/ Yes, with a better contingency plan/Yes, with larger epidemiological surveillance/Yes, if the regional situation is better/Yes, if there is better regional transparency/No/No answer
Do you think the eradication plan is well implemented in the region?	Yes/No/No answer
How do you think is the cost/benefit ratio of stopping vaccination?	Inadequate/Neutral/Beneficial
Do you think that vaccination is the most important measure to prevent FMD?	Yes/No

Annexed 2

Unconditional associations between demographic and risk related questions with willingness to stop FMD vaccination (Yes vs No), adjusting by sampling design

Variable	Probability of "Yes"	*P*- value
Strata		0.02
1	43.0 (4.6)	
2	27.1 (4.3)	
Working with beef cattle		0.17
No	25.8 (8.1)	
Yes	39.1 (3.7)	
Working with sheep		0.52
No	35.3 (4.5)	
Yes	39.7 (4.1)	
Working with dairy cattle		0.41
No	39.1 (4.1)	
Yes	33.0 (6.0)	
Working with other species		0.25
No	34.4 (4.1)	
Yes	42.6 (5.9)	
Number of farms where you serve		0.83
Less than 5	35.4 (5.0)	
6 to 10	40.3 (6.8)	
More than 10	38.9 (6.6)	
Region		0.04
West	24.3 (5.4)	
Northeast	42.2 (5.7)	
South-center	44.0 (6.1)	
Did you see a clinical case?		0.59
No	38.7 (4.1)	
Yes	34.8 (5.9)	
Do you think you are capable of diagnosing a clinical case of FMD?		0.55
2	28.0 (9.0)	
3	37.4 (4.7)	
4	40.3 (5.8)	
Do you think your colleagues are capable of diagnosing a clinical case of FMD?		0.52
1	37.8 (14.8)	
2	31.0 (5.7)	
3	39.2 (5.1)	
4	45.9 (8.7)	
In your professional activity do you consider a possible reintroduction of FMD to the country as a concern?		< 0.01
No	60.1 (6.0)	

Yes	26.3 (3.8)	
How would you classify the risk of introduction of FMD?		< 0.01
Low	59.4 (5.4)	
Moderate	28.5 (5.0)	
High	8.0 (4.5)	
Do you think the eradication plan is well implemented on the region?		0.27
No	33.1 (5.4)	
Yes	43.2 (7.5)	
How do you think is the cost/benefit relation of stopping vaccination?		0.60
Inadequate	33.2 (6.6)	
Neutral	39.1 (5.6)	
Beneficial	44.1 (9.4)	
Do you think that vaccination is the most important measure to prevent FMD?		0.31
No	46.3 (9.6)	
Yes	35.9 (3.8)	