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Yfirlit.

Heiti	**The breeders of local domesticates in the North Atlantic and their motives – an exploratory study**
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Markmið.

Effective communication between breeders, conservationists and scientists is crucial for the long-term stability of small populations of domestic animals. Although some institutions are actively communicating with important stakeholders such as breeders, limited information is to be found about stakeholder motivation and their experience of the communication effort. Therefore, we were interested in better understanding the underlying motivations for keeping local breeds, which are often economically unsustainable despite importance for conservation of genetic diversity. Additionally, we were interested in the current relationship between breeders and scientific institutions and possible gaps in the communication. To address this, we used semi-structured interviews with breeders of local breeds in Iceland and the Faroe Islands. The following questions were the starting point of the interviews:

1. What is the motivation of breeders for keeping local domesticates?
2. What are the main sources of knowledge regarding local domesticates for breeders?
3. How do breeders currently perceive the communication between themselves and science institutions?
4. What improvements do breeders think can be made in science communication from relevant science institutions?

The breeders included horse-, sheep-, goat-, and chicken breeders in Iceland and the Faroe Islands.

The results offer a unique first look at the dynamics of different stakeholder groups of the breeders and identification of the motives of local breeders. Additionally, the study is an important first step towards a more detailed study into this important subject and should be followed up with more interviews and preferably questionnaires.

Staða þekkingar.

Stakeholder participation in science projects is becoming increasingly common and is considered by many to be a cornerstone principle (Purvis et al., 2015; Stephenson et al., 2016; Unerman & Bennett, 2004). A stakeholder analysis, such as this project "The breeders of local domesticates in the North Atlantic and their motives – an exploratory study", is the first step in stakeholder participation giving a profile and help voice the opinions of the stakeholders (Reed, 2008; FAO - ComDev). So far there is very little official information to be found, and no stakeholder analysis has been done on breeders of the North Atlantic, and this is therefore an exploratory study. Although no such studies have been made in the North Atlantic a similar study was done in Finland where Ovaska and Soini (2016) set out to define the motivation of breeders of local domesticates. They divided them into 4 main storylines: 1) Sustainable use in new forms of entrepreneurship, 2) Sustainable use in agricultural primary production, 3) Service-based conservation, and 4) Product-based conservation as part of other livestock (Kantanen et al., 2015; Ovaska & Soini, 2017). If a similar pattern can be recognized in the breeders of the North Atlantic it might serve as inspiration to future studies and help researchers understand the motivations and needs of the end-users.

The project "The breeders of local domesticates in the North Atlantic and their motives – an exploratory study" has already started and a literature review has been made along with a detailed written proposal. Currently the student is focusing on collecting qualitative interviews in Iceland, Greenland, and the Faroe Islands.

Helstu niðurstöður.

The main conclusions of the project are the following: From these the main findings were:

1) Breeders are generally happy with the communication effort of scientific institutions but feel that it could be increased. Most believe that the best way to improve it is by doing more research focused on the local domesticates

2) The preferred ways of communication are through online applications such as Facebook, pre-existing magazines and webpages dedicated to the breeds.

3) The public has a generally positive attitude towards the local domesticates, with notable exceptions, but should be more involved and educated about the local breeds.

4) Breeder's motivations for keeping local domesticates is in general linked to certain traits and qualities rather than the historical or cultural past of the breeds, although that is the reason in some cases.

Attached is a thesis written by Christina Joensen describing the findings of the project: "**The breeders of local domesticates in the North-Atlantic: Communication and motives.**"

Science Communication & Society Specialization

THE BREEDERS OF LOCAL DOMESTICATES IN THE NORTH ATLANTIC: COMMUNICATION AND MOTIVES

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Abstract

Domestic animals have been an important part of human settlements, and one of the most recent ones was the settlement of the North Atlantic by the seafaring Vikings. The local domesticates had both production and cultural value to the Vikings, values, which still can be attributed to the local domesticates found in the North Atlantic. The domesticates are of interest for various reasons, one being that they may shed light on historical aspects of the Vikings. More importantly these breeds can be of great value as reservoirs of genetic diversity benefiting future food security. As the environment changes livestock will be subject to new diseases and environmental challenges, which they will be better equipped for if the various traits of local domesticates can be used and introduced to other popular breeds. Before disseminating new scientific findings, it is important to consult the breeders about the current state of communication between breeders and scientific institutions and to find out where it needs improvement. Any new findings might affect our understanding of origin of individual breeds, which makes it important to interact with stakeholders to understand better their motivations for breed selection and needs.

This thesis is based on 8 in-depth interviews with Icelandic and Faroese breeders of four local domestic species, namely sheep, horses, chickens, and goats. The analysis of the interviews was done systematically by coding them and dividing them into three superordinate themes, and each with different sub-themes. The superordinate themes are as follows: a) communication between breeders and scientific institutions, b) local domestic animals and the public, and c) motivation of breeders. The participants expressed many varied opinions, however, the following main findings were largely agreed upon: 1) that the breeders are generally happy with the communication effort that is performed by scientific institutions currently but believe that it needs to increase and improve, and that the best way forward is to increase the amount of research focused on the local domesticates, 2) that the preferred ways of communication is through Facebook, pre-existing magazines and webpages dedicated to the breeds, 3) that the general public has a positive attitude towards the local domesticates, but should be more involved and educated about the local breeds, 4) that the motivation of the breeders for keeping the local domesticates is linked to certain traits and qualities of the breed itself, rather than being linked with the historical or cultural past of the breeds.

The findings reveal that there is a need for more research and communication regarding the local breeds. In the discussion I argue that one part of the solution that ought to be considered by scientific institutions and researchers is increasing stakeholder participation. This is likely to improve cooperation and to be beneficial for both parts, as the researchers can receive firsthand knowledge about the breeds, while the breeder can feel more valued and increase their knowledge base about their breed through new research findings. An increased effort should be put into the dissemination of popularized texts through the heavily used platform Facebook and other pre-existing media to inform breeders and the general public. An alternative solution to increase the interest and public knowledge about the local domesticates, is allowing the public to spend more time with the breeds and in rural areas through for example farm visits.

One concern when disseminating new findings about the history of the breeds was whether it might have a negative effect on the motivation of breeders to keep the local breeds. Although literature frequently uses the historical value of the breeds as an argument for their protection, it was not mentioned as a main motivation for the participants to keep the breeds. The motivation of the breeders allows insight into some of the breeder's opinions and highlights positive and perhaps unique features of the breeds that can be used in future dissemination and inspiration for research projects.

Introduction

Motivation and relevance

The history of humans and animals is strongly intertwined; domestic animals have been kept by humans for the last 12,000 years and have had a huge impact on shaping human existence. However, humans have had a similar, if not larger part to play in the shaping of the domesticates, and have taken a few species and shaped them into around 3000 domestic breeds worldwide (Hodges, 2006; Ruane, 2000; Steele, 2015).
Amongst the last human colonization is the Viking settlement of the North Atlantic that took place between ca. 9th and 11th century (Dugmore, Keller, & McGovern, 2007). While the Faroe Islands and Iceland have been inhabited ever since, the Norse settlement in Greenland only lasted until the mid-15th century (Dugmore et al., 2007). This happened around a climate change and cooling of the environment, however, the reason as to why they left is still debated (Dugmore et al., 2012, 2007). With them the Viking settlers brought their domestic animals, among them cattle, sheep, goat, pig horse, chickens, dog, cat, and (McGovern, 2007). The settlement history of the domestic animals residing in the North Atlantic today is unsure and mostly relies on old historical sources. Some of the breeds have gone locally extinct, e.g. the Icelandic pig, and been reintroduced later in time. It is also likely that some of the breeds were imported after the Viking settlement, and many have probably been interbred with imported breeds since the settlement (Adalsteinsson, 1981).

"The Horses and Sheep of the Vikings: Archaeogenomics of Domesticates in the North Atlantic" is, a study aimed at better understanding the history of local domestic animals in Iceland, the Faroe Islands, and Greenland, as well as to give new insights into the process of settlement of the North Atlantic (Hallsson, 2016; Hallsson, Pálsdóttir, Boessenkool, & Kantanen, 2016). In the process, it might also shed light on topics that in some way contradict today's beliefs about the origins and histories of local breeds. As these beliefs may or may not affect the interest of local breeders in the respective breeds it is important, before disseminating any results that might harm the local breeds living today, to understand the motivations of the most important stakeholders, that is the breeders.

Breeders have different motives behind keeping domestic animals and therefore the value of the breeds might be split into different categories. The commercial breeds are most common on farms were breeders make a living out of the domesticates, however, there are breeds, particularly endangered local or heritage breeds which are less improved, who often have less commercial value (Kantanen et al., 2015). Even though some of the breeds have limited commercial value today, they may still be of value to society. Local domesticates are part of a living cultural heritage, as can some of the practices of caretaking and recreational uses that follow along. Sheep are an ideal example to illustrate the cultural importance of livestock animals. They have been kept for milk, meat and wool, thus contributing to several cultural aspects namely: food, raw material for textiles and artisan crafts, and they have had great commercial value as they created work for humans in the form of sheep farms (Gandini & Villa, 2003).

The domestic animals also have great historical value as the Vikings used them for many cultural and religious functions, and it has been theorized, that the domesticates used to have an influence on political issues of the Vikings and were used to dissipated social tensions (Lucas & McGovern, 2007). Although the domesticates partially were kept for cultural and religious reasons they were mainly kept for the produce of food and material products, such as meat and wool, qualities which are still valued and used in today's society (McGovern, 2007; Ovaska & Soini, 2016).

The domesticates of the North Atlantic still have great value for today's society (FAO Commission on Genetic Resources for Food and Agriculture, 2007). Besides having production and cultural value they can also contribute to the future commercial market of domesticates. Humans have come to rely heavily on domestic animals as a food source and livestock production is the most important sector in Northern European agriculture as measured by total value of production, which makes it necessary to take safety measures for the future (Anderson, 2003; Bennewitz et al., 2006; Kantanen et al., 2015). Higher genetic diversity decreases the risk of disease outbreaks, something which becomes increasingly important with the escalation of globalization and climate change (Kantanen et al., 2015). The chances of having disease outbreaks is further increased as there is a tendency for farmers to keep the same high producing breeds, thus decreasing the genetic variation which leads to smaller overall disease resistance (Hoffmann, 2011).

Organizations such as the Food and Agriculture Organization of the United Nations (FAO) have encouraged nations to preserve local domestic livestock as they might prove valuable in the future (FAO, 2013). EU has also encouraged the use of landraces to function in agro tourism and for sustainable use in agriculture, providing specialty products and genetic material (Ovaska & Soini, 2017). Some of the local breeds have certain immune system genes as a result of hundred or even thousands of years adaption to different environments and human selection (REF). These qualities are only present in certain breeds but can however be introduced to other breeds through crossbreeding. It is also useful to compare different breeds of the same species when locating certain traits, thus making it easier to select those traits (Gandini & Villa, 2003; Kantanen et al., 2015; Thornton, 2010).

In Europe many local livestock breeds have gone extinct and the numbers are still decreasing (Leroy et al., 2016). A similar pattern is found in the North Atlantic for certain breeds e.g. the Faroe Islands, where the oldest local sheep breed has gone extinct while the local pony today is a threatened breed (Søvn Landsins, 2018; Visit Faroe Islands, 2018). The Faroese pony went through a big reduction in population, as the breed was heavily exported and only left a few horses born between the 1940's and 1960's. Today the population has still not recovered and faces hard competition from other imported breeds (Kettunen & Berg, 2017). Increasing competition is a problem, which they might be facing in the future in Iceland as there is an increasing pressure from the public to attain cheaper meat products. Some fear that this might have an influence on the current numbers of local breeds as the import of foreign breeds is likely to increase and the local produce decrease (Erla Hlynsdóttir, 2011).

There are many different stakeholders that are relevant to the survival of the domestic breeds of the North Atlantic, such as researchers and policy makers; however, the breeders have the most important role. So, in order to protect local breeds in the future it is necessary to work closely with breeders, and to understand their motives for keeping local breeds. This way the positive aspects of the breeds and the needs of the breeders can be highlighted and used in future communication with the breeders and the public. One reason as to why it is important to communicate the results of this project to the public is because breeders need public support to continue their work. This might be because they need public funding, or because farmers need the public to understand why their products might be more expensive than those of rest of Europe and worth buying. Therefore, it is important to get input from the stakeholder breeders, before scientific results regarding the local breeds are disseminated to the public.

Theoretical framework

Drawing inspiration from developing countries

Stakeholder participation in science projects is becoming increasingly common and is considered by many to be a cornerstone principle (Purvis, Zagenczyk, & McCray, 2015; Stephenson et al., 2016; Unerman & Bennett, 2004). Although many recognize the value of stakeholder participation, organizations often fail to incorporate it sufficiently, sometime resulting in a feeling of mistrust from the stakeholders towards the scientists. One example of a large conservation project that failed to sufficiently reach the different stakeholders was the European Ecological Network - Natura 2000. Blicharska et al. (2016) recently published a review of 149 publications evaluating the outcomes from the Network where they analyzed the gaps in social science regarding the different research projects. Natura 2000 was a conservation network and one would expect that they had incorporated social science into their research projects. The review revealed that one thing most of the articles had in common was a general lack of communication between the researchers and stakeholders and that there was little or no stakeholder participation. They believe that this led to issues such as mistrust from stakeholders towards science and negative public perception of the projects of the researchers. In order to improve this matter, Blicharska et al. suggested improved communication to the public and that stakeholder participation should be implemented in an organized way (Blicharska, Orlikowska, Roberge, & Grodzinska-Jurczak, 2016).

The lack of stakeholder participation can also be seen in agricultural research, where a stronger infrastructure system between breeders and researchers is needed, but not often achieved (Miller, Hanson, Fretz, & Weismiller, 2004; Whyte & Crease, 2010). A common consequence of this is that the local stakeholders come to distrust researchers, as they feel that the researchers have a narrow conception of expertise and knowledge (REF). If the researchers show distrust towards relevant stakeholders and end-users it is to be expected that they should reply with similar attitudes. One classical example involves Cumbrian sheep in the 1980s after the Chernobyl incident where radioactive rains reached Cumbrian fields and polluted the lands and sheep. The researchers studied the incidents with their models with no regard to the knowledge of local farmers, whereas with their help they could have created much better models and avoided wasting time and resources (Whyte & Crease, 2010).

The communication between farmers and scientists has greatly improved since the 1980s, however there are still reports of disconnect between researchers and farmers in Europe. Some projects which aim at benefitting relevant stakeholders sometimes overlook exploring the actual needs of the stakeholders resulting in research agendas that do not fit the need of the users (Fresco, 2015).

There have also been reports from farmers that the material that scientists provide is too advanced and they therefore feel insecure about joining in scientific discussions (Clarke, 2003). Therefore, suggestions were made to apply an approach closer to that found in many developing countries in South East Asia, Africa, and North Africa, and to see whether any principles could be implemented in the UK. In the developing countries it was found that farmers and researchers worked closely together and had a better understanding of the needs of one another along with potential limitations. This insight displayed by both researchers and stakeholders, improved the research agenda and simultaneously introduced the stakeholders to the work of the researchers in a non-condescending way. This also helps the end-users feel that the research is theirs and gives a sense of ownership (Clarke, 2003; Haselock, 2010).

An excellent example of researchers and farmers working closely together is the Communication for Development (ComDev) created by FAO (FAO, 2018). ComDev seeks to

create research agendas based on dialogue and participation from local rural people allowing them to contribute and share their knowledge and opinions. This creates interaction between different stakeholders and promotes cooperation, and they work towards sustainable social change and seek to empower relevant stakeholders. There are three web-based platforms, namely in Africa, Asia, and Latin America. Even though the program is not aimed at Europe there are still valuable things to be learned from this project, and concepts and principles from this program will be incorporated into our current study. To deal with current and future conservation issues of the local breeds of the North Atlantic, it is necessary to collaborate with the local stakeholders and it is not a job that can be done by researchers and policy makers only. The most important stakeholder to future survival of the breeds are the breeders, however, the breeders need the help of policy makers, researchers, and the support of the public in order to continue their work in the future. This can be compared to the ComDev, where everyone needs to work together including the rural stakeholders in order to tackle future development issues (FAO, 2018; Ovaska & Soini, 2017).

There are certain precautions that must be taken when dealing with stakeholder participation. If stakeholder participation approached in an unorganized way, it can indeed result in the feeling of failure for both stakeholders and researchers. This calls for certain measures that have to be taken in order to do it successfully, e.g. have a good facilitator and to not make promises that you cannot keep when interacting with stakeholders (Crane & Livesey, 2003).

ComDev uses participatory planning, where the stakeholders are actively involved in the planning of the projects from start to finish. This way they have a say in the research and better insurance that their needs will be met. There are different levels of participatory planning and it can range from little, e.g. consultation and information gathering, to more extensive participation, e.g. having them participate in designing program activities. The importance of including the stakeholder participants from the start of the project is highlighted by literature, as it decreases the chances of making mistakes and allows timely adjustments of the project. It also encourages the stakeholders to consider the project as their own and thus to pick up a stronger and more positive interest (Anyaegbunam, Mefalopulos, Moetsabi, & Southern African Development Community. Centre of Communication for Development., 2004; FAO, 2018; Reed, 2008; Shirk et al., 2012).

Stakeholder Analysis

There are several steps to the approach that ComDev is taking, and they highlight the importance of starting out by building a good foundation through stakeholder analysis. There are several approaches to stakeholder analysis and one of the most common techniques used by ComDev is the key informant interview. These are semi-structured interviews with individual stakeholders, which allows an in depth understanding of the topic. There are some limitations to this method, such as the information gathered is specific to the individual, hence the reason why it is useful to gather information from several people who are in similar situations. This method provides an immediate insight into a topic and might reveal things that would be unlikely to appear in a quantitative approach. Compared to focus groups, where you can be somewhat restricted to planning one event, individual interviews can be flexible and a useful method if you want to gather data from a larger location (Acunzo, Pafumi, Torres, & Tirol, 2014; Anyaegbunam et al., 2004; Gill, Stewart, Treasure, & Chadwick, 2008).

According to ComDev's guidelines it is first necessary to identify the stakeholders and to break them into smaller stakeholder groups. In their guideline they describe two way the categorization of the stakeholders can be divided: (i) top-down ''analytical categorizations'' where the researcher decides on categories based on literature before the interviews, or (ii)

bottom-up ‘‘reconstructive methods’’ where the stakeholders are allowed to express their own opinion of which category they might fit into (FAO, 2018; Reed, 2008). With the current research project, the main category “breeder” has already been decided upon by the researcher, however, as there are no previous studies that have tried to identify breeders of local domesticates in the North Atlantic, a bottom-up approach will be taken, where the breeders will be asked to define their own subcategory. A similar approach was taken in Finland where Ovaska and Soini (2016) set out to define the motivation of breeders of local domesticates and divided them into 4 main storylines: 1) Sustainable use in new forms of entrepreneurship, 2) Sustainable use in agricultural primary production, 3) Service-based conservation, and 4) Product-based conservation (for conservation reasons only) (Kantanen et al., 2015; Ovaska & Soini, 2017). If a similar pattern can be recognized in the breeders of the North Atlantic it might serve as inspiration to future studies and help researchers understand the motivations and needs of the end-users.

Research questions

Although some science institutions are actively communicating with important stakeholders such as breeders (NordGen, 2017), little information is to be found about stakeholder motivation and their experience of the communication effort. Therefore, this study aims at making a stakeholder analysis of the breeders of the domestic breeds of the North Atlantic, and to gain a better understanding of what their underlying motivations are for keeping local breeds. Additionally, the current relationship between breeders and scientific institutions will be investigated, in order to find gaps in the communication, which might be improved. This will be done by answering the following questions:

1. What are the sources of breeder’s knowledge regarding local domesticates?

2. How do breeders currently perceive the communication between themselves and science institutions?

3. What improvements do breeders think can be made in science communication from relevant science institutions?

4. What is the motivation of breeders for keeping local domesticates?

To this end semi-structured interviews were performed with different types of breeders. The breeders included: horse-, sheep-, goat-, and chicken breeders. These interviews were mainly done in Iceland, however there were also interviews with breeders from the Faroe Islands for comparison.

This research aims at getting more insight into the dynamics of different stakeholder groups of the breeders and to identify the motives of the stakeholders to keep the local breeds. Additionally, the study will help promote stakeholder dialogue, investigating whether there are any improvements to be made in the communication between breeders, researchers and decisions makers such as politicians, so that researchers and policy makers can make more informed decisions in the future.

The research project “The Horses and Sheep of the Vikings: Archaeogenomics of Domesticates in the North Atlantic” has given rise to the current investigation. The research is funded by “Erfðanefnd landbúnaðarins” and is conducted at the Agricultural University of Iceland.

Data and methods

Participants – The research data was collected by interviewing different types of breeders of local domesticates in Iceland and the Faroe Islands. To find participants, e-mails were sent out to members of different breed organizations and contacted personally. There was no direct contact to the people in the organizations, but the distribution of the message seeking for participants was given to one of the board members of each organization, who since distributed it to the members. The contact information of the participants that were contacted personally was given by AUI employee Birna Baldursdóttir. The participants were selected to represent different local domesticates. The ideal situation would have been interviewing several breeders of each North Atlantic breed, however time constraints and lack of responses left only eight individuals willing to participate.

The recruited breeders were the following: (Icelandic chicken 1 (IC1)) a female breeder of the Icelandic chicken (landnámshæna) situated at a small farm in Iceland, (Icelandic chicken 2 (IC2)) a female breeder of the Icelandic chicken who had a chicken coop in California, (Icelandic sheep 1 (IS1)) a male breeder of Icelandic sheep who is situated at a small commercial farm in Iceland, (Icelandic sheep 2 (IS2)) a male Icelandic sheep breeder situated at a middle sized sheep farm in Iceland and also an agricultural scientist, (Icelandic horse (IH1)) a male horse breeder of the Icelandic horse situated at a commercial horse farm in Iceland, (Icelandic goat (IG1)) a female Icelandic goat breeder situated at a middle-sized commercial goat farm in Iceland, (Faroese sheep (FS1)) a female Faroese sheep breeder in the Faroe Islands situated at a large commercial sheep farm in the Faroe Islands, (Faroese horse (FH1)) a male Faroese horse breeder situated in the Faroe Islands breeding horses as a hobby. All the interviews were conducted in April and May 2018.

The interviews were done in person whenever possible but when the breeder was located in a different country they were always conducted over the phone without video. There were only problems with the connection during one interview, where the female breeder from California (IC2) had trouble hearing some of the questions. While there were problems hearing on the breeder's end, the replies could be heard clearly.
The interviews with Icelandic breeders were all done in English while the ones with Faroese breeders were done in Faroese and then translated and transcribed in English. They were transcribed using the "Infinity IN-USB2 Digital Transcription Foot Pedal" and "software Express Scribe Transcription Software" for playing the audio files, while the text was written with the free voice-typing function on GoogleDocs. The transcription was standardized and non non-verbal speech elements were left out (Jensen & Laurie, 2016).

Interview questions – the qualitative data was gathered through semi-structured interviews. This is an exploratory approach that has been chosen because of the novelty of the project (FAO, 2018; Gill et al., 2008). It was designed with the aim of finding the motivation of the breeders and finding out where they gain their knowledge and to analyze current communication between stakeholder breeders and researchers.

The questions are designed based on literature (Hoffmann, 2011; Ovaska & Soini, 2017) and on consultations with local researchers at the Agricultural University of Iceland (Pálsdóttir, A.H., Hallsson, J.H. and Baldursdóttir, B. K.). There were 20 questions in total where some had follow-up questions (appendix 1). The questionnaire was designed to have both open-ended questions and close ended questions. The open-ended questions were included to encourage the participants to discuss topics in depth while the aim of the close-ended questions was to decrease the time that had to be spent on the transcription and analysis of the interviews.

The interviews were structured so that everyone was asked the same questions, however, they were open in nature, and the interviews were able to go in new directions either led by the breeders or by the interviewee asking improvised follow up questions. To avoid interrupting the flow in the interview the interviewee tried to avoid asking questions that had already been answered trough replies to earlier questions.

Also, there were some slight variations between the English and the Faroese interviews, which could not be avoided. The reason being that a certain question in English can't be asked in an identical way in Faroese, and the meaning of the question might therefore be altered slightly. However, I try to be as honest as possible through the translations, and make the translation back to English reflect the Faroese meaning rather than translating it word by word, which might not make sense in English sentences.

Interviewee - Masters student Christina Joensen, as a part of her final thesis, directed all interviews. The student had no previous experience with scientific interviews, however she did have some experience with journalistic interviews. Additionally, the student had a scientific background and ties with the Agricultural University of Iceland (AUI). Although affiliated with the AUI the student worked there as an overseas intern, and has an outsider perspective on the Icelandic breeds. This was however not the case with the Faroese interviews, as the student is of Faroese origin and has been involved in the breeding of Faroese horses over many years.

Analysis - The analysis was done by coding all the interviews and finding reoccurring themes according to the qualitative analysis guideline of Jensen and Laurie (2016). After the interviews were transcribed a first draft of a codebook was made and since applied to all the interviews. Then the codebook was adjusted and used for coding all the interviews a second time. The second codebook was final and was used to find the reoccurring themes described in the results (appendix 2).

Results

The aim of the research was to investigate what underlying motivations breeders have for keeping local breeds, as well as exploring the current state of communication between scientific institutions, breeders and the public and how it might be improved.

The analysis was done systematically and divided into different themes and sub-themes. In order to keep the transparency of the interviews, quotes have been added as frequently as possible and have only been edited for grammatical corrections (Jensen & Laurie, 2016). The analysis was divided into the following superordinate themes:

a) communication between breeders and scientific institutions
b) local domestic animals and the public
c) motivation of breeders.

From these the main findings were:

1) that the breeders are generally happy with the communication effort that is performed by scientific institutions currently but believe that it needs to increase and improve. Most believe that the best way to improve it is by doing more research focused on the local domesticates
2) that the preferred ways of communication are through Facebook, pre-existing magazines and webpages dedicated to the breeds
3) that the public has a generally positive attitude towards the local domesticates, with notable exceptions, but should be more involved and educated about the local breeds
4) that the motivation of the breeders for keeping the local domesticates is in general linked to certain traits and qualities of the breed itself, rather than being linked with the historical or cultural past of the breeds, although that is the reason in some cases.

The current thesis addresses the most emergent themes, where there seemed to be most agreement between breeders, however, some distinctive statements made by breeders will also be addressed and discussed.

Superordinate Theme: communication between breeders and scientific institutions

This theme includes what sources breeders get their knowledge from and is followed by suggestions as to how the communication between scientific institutions and breeders can be improved.

Current sources of knowledge
There turned out to be many different sources from where the breeders gain their knowledge. All the participants have more than one source of knowledge and show a high initiative in searching for relevant information. The most frequently mentioned source was reading scientific papers and books, which was followed by reading historical sources and knowledge from other breeders or farmers. The categories that were less frequently mentioned were that the breeders would found information through the following sources: researchers, family members, by personal observations, a degree in agriculture or similar, veternarians, social media, or papers and webpages aimed at people with an interest in domestic animals. Some of these sources can be found in in the following statement:

"[IH1]: Both from official breeding with the FEIF organization, which is the federation of the Icelandic horse. So, I get a lot of knowledge there. And also, just from international studies and also from reading and both literature and keeping up with some new things, both on Facebook and on YouTube and everything."

The current state of communication
Three out of eight participants stated that there was very little to no communication between scientific institutions and breeders, and two of those were Faroese breeders.

"[I]: Yes. And do you think that scientific institutions communicate well with animal breeders?
[FS1]: In the Faroe Islands?
[I]: Yes.
[FS1]: No. I think that we should be a lot more ambitious, and do a lot more. That is my honest opinion."

In Iceland breeders stated that they were happy with the communication that was being done, but most of those also stated that scientific institutions could put a larger effort into communicating with breeders: "what we have been doing together has been very positive but they could do much more." Some of those breeders also experienced that most of the communication was initiated by the breeders rather than the scientific institutions. This was in one case referred to as being a positive thing:

"[I]: And do you think that scientific institutions currently are communicating with breeders such as yourself sufficiently?
[IC1]: Yes a little bit, not really all that much, but we try to do that. And I think that, to tell you the truth, it is more we that contact them than they contact us, which is quite good."

The breeders in Iceland mostly responded positively about the quality but not the quantity of the communication effort from scientific institutions, however, there was a more diverse response on whether they received help from scientific institutions.

It would seem that most breeders of local domesticates are not receiving the support that is expected from scientific institutions and from the government.

"[IG1]: I don't get any help from them. I mean from Hvanneyri the University of Agriculture, they bring their students, I get about two visits from two different groups every year and that is my way to help to educate about the goats, but I have not gotten a lot of help from institutions here."

Although there are positive remarks on the current communication between breeders and scientific institutions, there were also some remarks from breeders on disagreements. One breeder felt a lack of interest towards the breed from scientists :

"[IC1]: Some of those scientist, they don't really... they don't care because they are thinking in different lines. And I do understand this, two of my sons are scientists, so I do understand that." while another breeder mentioned that some institutions had made it difficult for her to create produce from her breed: "they should help each other, these two pools, instead of fighting."

Improvements to be made

When the breeders were asked what improvements could be made on behalf of the scientific community, most agreed and requested more research. This was expressed in different ways and there were many suggestions on what kind of research is needed for the different breeds:

"[IC2]: The government yes, the Icelandic government. The agricultural department should do more to protect the chicken and to find out where they came from if that is possible. Who they are related to. I wish that they would do that. A DNA study."

Another matter, which is somewhat connected to the request for more research is, that the breeders doubt whether scientific institutions currently have a high enough span of knowledge, to actually help breeders. This was mentioned directly by some while others mentioned that they would rather seek knowledge about the breed from institutions or colleagues located abroad:

"[FS1]: Well I would like it if there was more communication and more counseling. I think. I doubt whether the counseling authorities… I doubt whether they have sufficient qualifications within for example sheep breeding. As far as I know there is no one who specializes with sheep keeping for example. Well yes. They could be a lot more ambitious on the public side."

The impression of a lack of professional knowledge is also expressed through available public sources. One breeder pointed out that the online information regarding the Icelandic goat was either out of date or not based on credible sources:

"[IG1]: But I mean the numbers that you are reading on the Internet about how much an Icelandic goat is milking that is just nonsense. Because for many years nobody has been milking all the period. So, they can't say that they milk 2-300 liters per year, it's much more if I waited every day now. So, there are a lot of things… I mean you can go into the website of the zoo in Reykjavik, and it says that goats can be 15 years old, that the normal age is 15 years. I have never heard about a 15 year old goat. My oldest one has been 13, but

normally they are about 8, that's a normal living age… …so there are so many things that you need to stabilize, to find the right things by researching as they are today."

The above statement also reflects a lack of communication between breeders and scientific institutions, something that is also reflected in a comment where the breeder mentions that it would be useful if the scientists consulted the breeders of their needs:

"[IC1]: yes! And I would also like to… there's one thing that the scientists are not doing, and that is coming and saying, is there something you need? You see. What is it that you need? Can we do something that will help you? But they don't do that. It will always have to be the other way."

One breeder mentioned an example regarding the Icelandic goat archive, where consultation with the breeder before initiating a project could have improved it and helped avoid confusion. At current state the Icelandic goats are registered in the same website and system as the Icelandic sheep, something that has been causing trouble and confusion for the goat breeder "Why wasn't it possible to just make a new database for the goats from the start, instead of always putting them under the sheep? Because they are so different (IG1)."

Superordinate Theme: local domestic animals and the public

This theme focuses on how breeders experience the public attitude towards local domestic breeds, and how they believe the relationship might be improved.

General positive attitudes from the public
The breeders all agreed that the general public has in general a positive attitude towards the local domestic breeds. Most breeders also agreed that the general public should be more involved with the local breeds, however one breeder also indicated that it should be selected knowledge:

"IH1: Yes I think it should be shared with the public, but you have to, before you have to decide what is for the scientists and what is for the common reader."

Although the breeders report a positive attitude from the public some pointed out that there is little knowledge regarding the breeds. One breeder mentioned that the idea of Faroese sheep is perhaps part of a larger image, which the Faroese people identify themselves with and think fondly of:

"[FS1]: I have no doubt that Faroese people are very proud of the island life. Both of the agriculture and the nature in the Faroe Islands, it is all connected… …Well for example there is a huge interest in visiting Dímun. I think that in this sense people are proud of having an island society and culture and so on, but the actual sheep keeping… the average Faroese person does not get into the details of agriculture in that sense. I would not say that."

The same breeder is also involved with tourism along with two other participants and they all reported a large interest for the local breeds from people from abroad. The breeder who lives in California pointed out the same interest from people from all over the United States. The people from abroad are represented by tourists, breeders, people who wish to help, and people who have a general interest in the breeds:

"[IH1]: We have nearly unlimited demand abroad for knowledge. It's nearly unlimited so it's just a matter of how we present it. It is maybe the biggest handicap for us to do."

Although the breeders state that the largest part of the general public has positive attitudes towards the local domestic breeds, there is also mention of somewhat negative attitudes. Vegans are mentioned by two Icelandic breeders while land erosion linked to local domesticates was only mentioned once (IS1 is the breeder and IS2 helps translate):

"[IS1]: Most of the people are positive, but there is always some group that is very negative about it.
[I]: Ok yeah. And the positive people, what are the positive about?
[IS1]: they like the meat, and think that we are doing good work I think.
[I]: Ok. And then people that are a bit more negative.
[IS1]: It is mostly the people that are vegan
[IS2]: Animal welfare.
[I]: Oh vegans. Ok
[IS1]: And also people that think that we… are destroying
[IS2]: interrupting the nature you know. That the sheep are destroying the land or you know."

One comment to the practice of veganism pointed out that the survival of domestic breeds depends on the public demand and utilization of meat and that the public should be more aware of this:

"[IG1]: so after 10 years, if everybody in Iceland got vegan we would not have any animals after 10 years, because they can't survive without us, they need people to take care of them… …this knowledge needs to be more open. That we can't have animals living here without using them."

Reaching the public

The breeders were asked to give suggestions about what methods of communication would be best to apply, in order for scientific institutions to reach the public and relevant stakeholders.

Social media is strongly agreed upon as being a good tool for communication regarding the local breeds, however, some of the breeder also point out that it is also a tool that calls for cautious actions. This is grounded on the stream of fake news that is displayed on the user feed and on the bad attitudes and behavior that is sometimes displayed by users on social media. The most popular social media platform between the participants was Facebook and there was no mention of the usage of other social media platforms.

"[IH1]: No but still you know Facebook can also be this center of false news and you can also make threats there. Then you suddenly disappear because somebody is fading them away because someone doesn't like what is written there so. That is also a tricky one."

Many breeders also reported on wanting to receive information through preexisting webpages and papers that are dedicated to the breed, e.g. the magazine *Landnámshænan* which is a magazine for breeders of the Icelandic Settlere chicken or the website of FEIF - International Federation of Icelandic Horse Associations. One breeder pointed out the complexity of the current available scientific information about the local breeds and states

that it needs to be written in a style that can be read and understood by laymen and the general public:

"[IH1]: Because the scientific community or institutions are not preparing their material enough, they are not using their knowledge, and they are not writing enough of good essays or giving the knowledge away in such measures that we common people can read it. They are always writing essays or articles for the scientists, which many horse breeders don't have a fucking clue what they are writing about. And so they need to deliver much better in. Because there is knowledge there, both in the university and Hvanneyri, and also the University of Holar, there is a lot of knowledge there, but they need to write it better down for the common people."

Communication tools that were less frequently mentioned were: using radio and documentaries, doing more research, and dissemination through education. It was pointed out by one breeder, that the relationship between breeders and the public had weakened with time, and that education or creating direct contact between the public and the breeds, might improve the current connection:

"[IS3]: For example, through teaching in our schools, we should not forget to mention their role in this country's history. And we could try to… when I was young it was very common that young people in Reykjavik worked on the farms… so this relationship to the farmer's made people very well aware of what was happening in the countryside. So there was a good connection. But now the last 30 years perhaps, then this is not so much."

Superordinate Theme: Motivation of breeders

This theme addresses what kind of breeders the participants define themselves as and what motivations breeders might have for keeping the local domestic breeds. It also looks closer at how the possible Viking or settler origin of the breed affects the will to keep the breed.

Self-definition

In the interviews the breeders were asked what kind of breeders they would define themselves as. The definitions they came up with have been listed according to how often they were mentioned: 1) small scale farmer, 2) industrial farmer, and 3) tourist breeder. The following definitions were each mentioned once: hobby breeder or conservation breeder, and breeders that earn money on breeding and selling local domesticates. Some of the breeders also defined themselves with more than one term.

"[IG1]: …and since that it became a little bit like my, what do you say, mission or something I really felt I had to do. To breed them up and tried to use them as farming animals, because for so many years they had been just pets, and you never save a breed by having them as pets. A breed has to work for them, so you can say that to you keep the breed alive."

Main motivations

When asking for the motivation to keep the breeds, most of the breeders had motivations linked to certain good or special qualities of the breed.

"[FS1]: And when you see how these animals live and how they take care of themselves, I think it makes you so humble and you get fascinated by them. So that is actually it. So the situation with our sheep is: they take very much care of themselves, and I

think that they are fantastically well adapted. I think that is a motive by itself. You simply admire these creatures. You get so humble when you see how well adapted they are."

Other motivations for keeping the breeds included wanting to keep the breed from going extinct and the wish to improve the breed.

When asked why it is important to keep the breed for the future some other reasons were mentioned, the most frequent being that the breed is special. This was closely followed up by the historical and cultural importance of the breeds. Thirdly they also mentioned that the breed is worth keeping for its good or special qualities. Another reason why some of the breeders wish to keep the breed is that it is personally important to them. There are different reasons for the personal wish to keep them, but some of them being nostalgia and the wish to pass on the breed to future generations:

"[I]: And why is it important to keep the Icelandic chicken breed for the future?
[IC1]: It is a hard question because it depends on who you ask. I mean is it important to keep anything, I mean the world is of course changing so rapidly, and there are so many things that I know that you don't know and there are so many things that your children will never know about that you know now you see. And is it important? Does it matter? or not? I don't know. For me it matters because I think it would be very sad if my grandchildren would never get to know chickens like these, because they are very special. So good things from the past or something that you want to remember, but not the bad ones you see. And reading those animals that have a special character and have something to give us I think that is very important, and that is why I do it."

Viking heritage

Although many mentioned the history and culture as being an important part of the breed, this was not mentioned as a direct motivation for keeping it.

In order to go into the depth of this matter they were asked whether it was important that the breed was a settler or Viking breed. All breeders except one agreed that the Viking/settler origin of the breed was a positive factor, and most of the breeders also reported that the Viking heritage was an important part of the breed. One breeder mentioned the reason as to why the settler origin is important is because of the public image of the breed:

"[I]: And is it important to you that the breed is a settler or Viking breed?
[IS1]: Yes.
[I]: And can you tell a bit more about why that is?
[IS2]: To keep our specialty is important.
[IS1]: And the purity. Press that is the main reason." (Icelandic sheep)

Although most of the breeders agreed that it was important that the breeds were of Viking/settler origin, the main part of the breeders did not think that they would change their mind about the breed if it was scientifically proven not to be a Viking or settler breed. A reoccurring statement was that the breed would still have an interesting and important history:

"[I]: In case scientific investigations show that the Faroese sheep are not a settler breed, do you think the breed would lose value?
[FS1]: No I don't think so. In case it is, it would be interesting and exciting, but it has a history regardless. One thing to mention again about this fantastic animal is the

practicality of it, which has the most value. One gets truly humble when seeing how they can manage."

Only one replied that it would change his mind to some degree, while another breeder was unsure how she would react.

Discussion

The current study focused on making a stakeholder analysis and to explore opinions of eight breeders of local domestic animals located in Iceland and the Faroe Islands. The current state of communication between breeders and scientific institutions was explored from a breeder perspective along with possible improvements that can be made. In order to get a better understanding of the breeders and their relationship to their local breeds the motivation for keeping the different breeds was investigated. There are no previous stakeholder analysis of breeders of local domesticates in the North Atlantic, which makes this a novel and unexplored area of research. The current study gives insight into the communication between scientific institutions and breeders, and questions breeders whether they think that the general public should be more involved with the local breeds. It also seeks to reveal motivations of the breeders, in order to get a better understanding of why they keep the local breeds.

More research and stakeholder involvement

The main improvement that breeders wanted scientific institutions to make regarding communication between the two parts was to increase the amount of research that is being done on the local domestic breeds. One possibility might be that the breeders are unaware of existing research, as most of it is currently written for scientists (Konijnendijk et al., 2007), however, most of the participants report that they read scientific papers, and the wish for more information should therefore not be attributed to this explanation alone. They did not state how an increased amount of research would improve communication, however, if the breeders realize there is a need and express a wish to improve it, there is the chance that they might be willing to be involved in future research projects. This could possibly be the first step towards stakeholder participation in relevant research projects (Acunzo et al., 2014).

As earlier mentioned stakeholder participation is considered by many to be an important component of research projects, and if it is approached in an organized way it might help improving projects and the cooperation between breeders and researchers (Purvis et al., 2015; Reed et al., 2009; Unerman & Bennett, 2004). The current study shows that some of the breeders expressed a wish to have some influence on the decision making of research topics. They would like to have researchers investigate topics that were more useful to the breeders, and there was a wish that scientists would show a stronger interest in the local breeds. There are divided opinions on whether stakeholder participation decreases the quality of scientific work (Bäckstrand, 2003), however it has in many cases been beneficial and has helped adding new information, ideas, and analysis (Beierle, 2011), and ought to be considered in the future decision making regarding the research of local domesticates.

Signs of a lack of communication

Some argue that stakeholder participation and their involvement in the decision making of research questions requires too much effort and time, compared to the outcome (Young et al., 2013). However, there are examples where increased stakeholder participation could have helped creating an improved and better informed research project (Whyte & Crease, 2010). Stakeholder participation is particularly important in projects, where the stakeholders themselves are the end-users (Clarke, 2003). One example where scientists in Iceland have put an effort into helping breeders is regarding the registration of Icelandic goats. Rather than creating a new database for the Icelandic goats, the goats are added to the Icelandic sheep database. It might seem like an easy solution, however, the participant points out that the system does not fulfill the requirements of registering goats, and it makes the registration more complicated than it has to be. If the needs of the end-user had been taken

into consideration at an earlier stage, wasted time and frustration could perhaps have avoided (Fresco, 2015).

Stakeholder involvement has been proven beneficial to the relevant stakeholders, however, it is important to approach it in an organized and structured way. If not then it might result in the feeling of mistrust from stakeholders in research projects, where the communication between stakeholders and scientists has been insufficient (Blicharska et al., 2016; Crane & Livesey, 2003). Although most of the breeders deemed the communication between themselves and science institutions to be mostly positive, there were also some signs of mistrust. One example of how this mistrust was expressed was through the doubt of whether some scientists had the right professional knowledge and skills to make statements about the local breeds. Another example was the lack of knowledge and wrong information that could be found through online sources about the goats. The signs of mistrust are partially an indication of a lack of communication between breeders and scientific institutions and it could be improved if scientific institutions consulted more with breeders and put an effort into gathering their first-hand knowledge about the local breeds (Bäckstrand, 2003; Stephenson et al., 2016).

Reporting back to breeders

Some of the participants felt that the communication that existed between breeders and scientific institutions was largely due to the effort put in by the breeders. One breeder reported that she helped scientific institutions, but that she received little help and information in return; this included not getting feedback or results from research projects, which she had contributed to. This is an issue that is important to improve, and one that can easily lead to mistrust and conflicts between breeders and scientists if left unresolved (Crane & Livesey, 2003). One solution that does not take too much time and effort is reporting research findings back to participants who in other studies have expressed gratitude when it was done. This way the research findings can be of benefit not only to the research community but also to the relevant stakeholders. Reporting back can also allow the stakeholders to give their interpretation and bring up additional valuable information. (Stewart & Draper, 2009).

Current sources of knowledge

The main source of information that was mentioned by the breeders was reading scientific papers and books, and most of the breeders had a wide span of different sources. This shows that the participants display a high initiative to find information on the breeds they keep, and they are even willing to find and read relevant scientific papers. The reason why scientific papers and books are the main source might be because there is little else information available, but it could also be due to an interest in reading all relevant information, as has been the case with some medical stakeholders (Kuehne & Olden, 2015; Nunn & Pinfield, 2014). This is also supported by the diversity of knowledge sources the breeders utilize, e.g. historical sources, colleagues, researchers, and veterinarians.

Popularized texts

When asked what type of communication the participants would prefer, most of them mentioned pre-existing media, i.e. Facebook groups, magazines and webpages dedicated to the breeds.

If more scientific knowledge is to be disseminated through these channels it is necessary to report findings in a more comprehensible way. This study had one participant who mentioned that the available information on the local breeds was too complicated for the general public; something that clearly was the cause of frustration for the breeder. Such an issue can distance the scientists and their research from the breeders, and can in some cases

cause the feeling of insecurity or mistrust (Clarke, 2003). Therefore, it is important to disseminate scientific findings in a comprehensible and popularized format. The need of more popularized material is not only relevant for the locals, as one participant express that there is a big interest in the local breed from abroad, and therefore scientific institutions ought to consider translating material into English.

Communication on Facebook

There was a large agreement from breeders that Facebook was a good tool for the dissemination of scientific knowledge. Facebook has been reported to be useful to publish scientific findings and literature, and has been used as a platform for discussion and for facilitating communication between different stakeholders (Farmer, Bruckner Holt, Cook, & Hearing, 2009). A similar approach might be useful to apply to the dissemination of knowledge about the local breeds, as Facebook is very popular in Iceland and has 260.000 Icelandic users. One problem that can sometimes be found when trying to disseminate knowledge on online platforms is that the information sometimes fails to reach older generations (Farmer et al., 2009). However, in Iceland Facebook is also popular with older users and 23% are aged 55+ while more than half are aged 35+ (Napoleoncat.com, 2017). Therefore, Facebook could be valuable communication tool for reaching older generations as well as younger ones. While there is no data to be found on the age of Faroese Facebook users, Facebook is by far the most popular social media platform in the Faroes, and ought to be considered for the use of scientific communication by Faroes scientific institutions (StatCounter 2018). Facebook could also help stakeholders connect with other stakeholders outside Iceland and the Faroe Islands, which is of relevance, since some of the breeders report an interest in the local breeds from foreigners (Farmer et al., 2009).

One issue that was pointed out by the breeders was fake news, which sheds light on a mistrust that people possibly feel when finding information on Facebook. This a reasonable reason to be skeptical and Facebook has been one of the main social media to disseminate fake news (REF). Although there is reason to be skeptical and cautious when investing time and effort in disseminating scientific knowledge on Facebook, it does not necessarily mean that it has to be avoided. There is a need of professional knowledge from trustworthy sources and Facebook can still serve as a valuable tool in the dissemination of knowledge if approached correctly (McClain, 2017).

Local breeds and the public

The breeders mostly agreed that the public had a positive attitude towards local breeds, and that the public should be more involved. It was mentioned that the public generally has little knowledge about the breeds and that there is a larger gap between the public and the rural lifestyle than there was some decades ago. This is might be due to urbanization and the increasing distance between people living in urban settings and rural surroundings (Miller et al., 2004). One consequence is vegetarianism and veganism, which is on the rise, and the participants did mention negative attitudes coming from vegans. One participant highlighted that people in general did not realize that it is necessary to use the local breeds for the animal product or recreational value, if the breed is to be kept from extinction. It is important to inform this to the public as they might realize that local breeds often can offer more ethical animal products compared to commercial breeds, in that the local breeds are well adapted for their natural settings (Koehler-Rollefson & Meyer, 2014).

There are many different ways of informing the public and some of the suggestions included using radio programs, documentaries, and dissemination through public education. These are often used tools and could help disseminating knowledge about the breeds to a broad and diverse audience (Nisbet & Scheufele, 2009). One of the breeders mentioned that another possibility could be by having people from the cities come and visit or working on

the farms. This in in line with a study that compared people living in small and large urban areas in England. The study showed that people who visited the countryside frequently had a higher biodiversity knowledge and support for conservation than those who did not spend much time in the countryside (Berenguer, Corraliza, & Martin, 2005; Coldwell & Evans, 2017).

Breeder motivation

In order to get a better understanding of the breeders, the participants were asked to categorize themselves as what kind of breeder they are. This was done with a bottom-up "reconstructive-methods" where the breeder was allowed to describe their own category (Acunzo et al., 2014; Reed, 2008). The categories were the following: 1) Small scale farmer, 2) industrial farmer, 3) tourist breeder, 4) hobby breeder, 5) conservation breeder, and 6) breeders by profession. These categories represent different ways of using the animals and can be interpreted as the following: Industrial farmer and being a breeder by profession can be considered product-based use, tourist breeders and hobby breeders a service-based use, and conservation breeders a conservation-based use. It is difficult to place the most popular category 'small scale farmer' and it is likely to fit into different uses. This might be useful information for conservation reasons as the breeds are more likely to be kept if they have different uses, e.g. a conservation use on its own might have a higher risk of extinction as it simply would be kept as a reserve for the future. If the breeders are encouraged to take an approach to an increased sustainable use of the local breeds, it might be beneficial to the breeders and the local breeds in the long run (Ovaska & Soini, 2017). The categories in which the breeder belongs to seems to be tied to the breed they keep, and which use that breed might have, e.g. horses might be kept in a more service based way while sheep are mostly kept for their product. Therefore it is necessary to investigate the categories of each breed separately in order to work out a suitable conservation strategy (Ruane, 2000).

One cause of concern was whether any controversial results might change the motivation of breeders for keeping local breeds. The Viking heritage is a strong and reoccurring theme in Icelandic culture and identity and is often used in politics and museum and heritage sites (Kjartansdottir, 2011). This is also evident in the new exhibition "Viking Animals – The Secret of the Settlement" which shows the strong link between the modern local domesticates and the Viking heritage (Hogg, 2017). Therefore, it might be theorized that the local breeds could loose some cultural value to Icelanders if research shows that some of the breeds arrived a long time after the Viking settlers. Such results could have the potential to change the motivation of the breeders to keep the local breeds. The current study showed that the main motivation for keeping the local breeds was not linked with the settler origin of the breed, but rather with the special qualities that each breed possessed. The history and background of the breed was only mentioned as a reason for maintaining the breed for the future, and most breeders did not think that they would change their mind about the breed if it turned out not to be a settler breed. The main motivation of the breeders is not in accordance with one of the most frequently mentioned arguments for the conservation of the local breeds, that the local domestic breeds need to be conserved for the future because of their historical and cultural values (Gandini & Villa, 2003; Hodges, 2006; Ruane, 2000). The breeders seem to find the biggest value of the breeds in the characteristics and qualities of the breed itself, and it is well worth investigating these qualities further, if the breeds are to be more popularized among the general public and important stakeholders.

Study limitations

The findings and reflections of the interviews are based on the opinions of eight breeders and are therefore still individual reflections on the topics. As the current study is novel in its field an in-depth approach with semi-structured interviews was taken, in order to get a more detailed understanding of the participants opinions and thinking (Jensen & Laurie, 2016). In

order to find any reoccurring trends and before making any generalizations, a broader quantitative investigation is needed making distinctions between the different breeds and between the different countries. However, the current study gives a deeper look into different topics and helps highlight were future research and communication actions are needed.

Conclusions

The current thesis explores the view of various livestock breeders in the North Atlantic, and although they offered a variety of opinions, some of the topics were reoccurring and could be divided into different themes. Most of the participants found the current communication between breeders and scientific institution to be positive but also deemed the amount to be insufficient. The main suggestion as to how the communication between breeders and research institutions could be improved, was to increase the amount of research that is done on the local domestic breeds.

All the participants got their knowledge about the breeds from a wide range of sources the most popular being scientific papers and books. Although the participants showed great initiative in searching for sources, their preferred way of communication would be through Facebook and pre-existing magazines and webpages. This indicates a need for an increased amount of popularized texts about the local breeds, aimed at breeders and other people with an interest in the breeds.

Almost all participants agreed that the general public has a positive attitude towards the local breeds and that the public should be more involved with the breeds. Some participants also noted that there was a lack of public knowledge about the breeds and some suggested ways to improve this would be through different media such as Facebook, documentaries, through public education, and by having the people spending more time in rural areas.

The motivation of the participants for keeping the breeds was not linked with the Viking or settler origin, but was for most associated with the special qualities their breed possesses.

The current relationship between breeders, scientific institutions, and the general public is at first glance largely positive. However, the in-depth interviews reveal that there are some issues that are a source of frustration for the participants. These are things such as a lack of popularized texts about the local breed, false information about the breeds on public websites, and a lack of knowledge about the breeds displayed by the public. This calls for an increased effort from relevant scientific institutions to invest more in the dissemination of knowledge about local breeds. In this thesis I argue that that increased stakeholder participation in relevant research projects might help improve the relationship between breeders and researchers, and contribute valuable knowledge to both. It is also stressed that researchers need to report research results back to breeders, in order to avoid any feelings of mistrust and to ensure that relevant stakeholders can make use of new knowledge.

This study gives an insight into the motivation of keepers of local breeds and how they identify themselves as breeders. This information can be used to get a better understanding of breeders of local breeds and their breeds, but might also serve as a source of inspiration when planning future research and communication strategies.

Further studies are needed to explore if there are differences between breeders depending on which species is being bred and between countries, in order to get a more general view of each breed. This thesis is an effort towards evaluating the communication between breeders and scientific institutions and uncovering gaps that need improvement.

References

Acunzo, M., Pafumi, M., Torres, C., & Tirol, M. S. (2014). *Communication for Rural Development Sourcebook* (1st ed.). Rome: FAO.

Adalsteinsson, S. (1981). Origin and conservation of farm animal populations in Iceland. *Sonderdruck Aus Zeitschrift Fur Tierzuchtung Un Zuchtungsbiologie*, *98*(H. 4), 258–264.

Anderson, S. (2003). Animal genetic resources and sustainable livelihoods. *Ecological Economics*, *45*(3), 331–339. http://doi.org/10.1016/S0921-8009(03)00088-0

Anyaegbunam, C., Mefalopulos, P., Moetsabi, T., & Southern African Development Community. Centre of Communication for Development. (2004). *Participatory rural communication appraisal starting with the people : a handbook*. Food and Agriculture Organization of the United Nations. Retrieved from http://www.fao.org/docrep/008/y5793e/y5793e00.HTM

Bäckstrand, K. (2003). Civic Science for Sustainability: Reframing the Role of Experts, Policy-Makers and Citizens in Environmental Governance. *Global Environmental Politics*, *3*(4), 24–41. http://doi.org/10.1162/152638003322757916

Beierle, T. C. (2011). The Quality of Stakeholder-Based Decisions, *22*(4). http://doi.org/10.1111/0272-4332.00065

Bennewitz, J., Kantanen, J., Tapio, I., Li, M., Kalm, E., Vilkki, J., … Meuwissen, T. H. (2006). Estimation of breed contributions to present and future genetic diversity of 44 North Eurasian cattle breeds using core set diversity measures. *Genetics Selection Evolution*, *38*(2), 201. http://doi.org/10.1186/1297-9686-38-2-201

Berenguer, J., Corraliza, J. A., & Martin, R. (2005). Rural-Urban differences in environmental concern, attitudes, and actions. *European Journal of Psychological Assessment*, *21*(2), 128–138. http://doi.org/10.1027/1015-5759.21.2.128

Blicharska, M., Orlikowska, E. H., Roberge, J. M., & Grodzinska-Jurczak, M. (2016). Contribution of social science to large scale biodiversity conservation: A review of research about the Natura 2000 network. *Biological Conservation*, *199*, 110–122. http://doi.org/10.1016/j.biocon.2016.05.007

Clarke, B. (2003). Report: Farmers and Scientists - A Case Study in Facilitating Communication. *Science Communication*, *25*(2), 198–203. http://doi.org/10.1177/1075547003259450

Coldwell, D. F., & Evans, K. L. (2017). Contrasting effects of visiting urban greenspace and the countryside on biodiversity knowledge and conservation support. *PLoS ONE*, *12*(3), 1–18. http://doi.org/10.1371/journal.pone.0174376

Crane, A., & Livesey, S. M. (2003). Are you talking to me? Stakeholder communication and the risks and rewards of dialogue. *Unfolding Stakeholder Thinking 2: Relationships, Communication, Reporting and Performance*, (August), 1–32.

Dugmore, A. J., Keller, C., & McGovern, T. H. (2007). Norse Greenland Settlements: Reflection on climate change, trade and the contrasting factes of human settlements in the North Atlantic Islands. *Arctic Anthropology*, *44*(1), 12–36. http://doi.org/10.1353/arc.2011.0038

Dugmore, A. J., McGovern, T. H., Vesteinsson, O., Arneborg, J., Streeter, R., & Keller, C. (2012). Cultural adaptation, compounding vulnerabilities and conjunctures in Norse Greenland. *Proceedings of the National Academy of Sciences*, *109*(10), 3658–3663. http://doi.org/10.1073/pnas.1115292109

Erla Hlynsdóttir. (2011). Ódýr matur er dýrkeypt blekking - Vísir. Retrieved March 14, 2018, from http://www.visir.is/g/2011110429276

FAO. (2013). *In vivo conservation of animal genetic resources*.

FAO. (2018). Communication for Development | FAO | Food and Agriculture Organization of the United Nations. Retrieved March 15, 2018, from

http://www.fao.org/communication-for-development/en/
FAO Commission on Genetic Resources for Food and Agriculture. (2007). GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES and the INTERLAKEN DECLARATION. *World's Poultry Science Journal*, 286. http://doi.org/10.1017/S0043933909000245
Farmer, A. D., Bruckner Holt, C. E. M., Cook, M. J., & Hearing, S. D. (2009). Social networking sites: A novel portal for communication. *Postgraduate Medical Journal*, *85*(1007), 455–459. http://doi.org/10.1136/pgmj.2008.074674
Fresco, L. O. (2015). The new green revolution: Bridging the gap between science and society. *Current Science*, *109*(3), 430–438.
Gandini, G. C., & Villa, E. (2003). Analysis of the cultural value of local livestock breeds: A methodology. *Journal of Animal Breeding and Genetics*, *120*(1), 1–11. http://doi.org/10.1046/j.1439-0388.2003.00365.x
Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal*, *204*(6), 291–295. http://doi.org/10.1038/bdj.2008.192
Hallsson, J. H. (2016). *The Horses and Sheep of the Vikings: Archaeogenomics of Domesticates in the North Atlantic. The Icelandic Research Fund 2016. Project Grant – New proposal. Detailed project description.* Retrieved from https://app.cristin.no/projects/show.jsf?id=550767
Hallsson, J. H., Pálsdóttir, A. H., Boessenkool, S., & Kantanen, J. (2016). Hestar og sauðfé víkinganna: Fornerfðafræði húsdýra í Norður-Atlantshafi. Retrieved March 12, 2018, from https://sjodir.rannis.is/AllocatedFunds/meirasida.php?a=rsj&b=162783051
Haselock, S. (2010). Make it Theirs. The Imperative of Local Ownership in Communications and Media Initiatives. *United States Institute of Peace. Special Report*, *October*, 20.
Hodges, J. (2006). Conservation of genes and culture: Historical and contemporary issues. *Poultry Science*, *85*(2), 200–209. http://doi.org/10.1093/ps/85.2.200
Hoffmann, I. (2011). Livestock biodiversity and sustainability. *Livestock Science*, *139*(1–2), 69–79. http://doi.org/10.1016/j.livsci.2011.03.016
Hogg, L. M. (2017). Viking Animals – The Secret of the Settlement. Retrieved from http://borgarsogusafn.is/en/the-settlement-exhibition/exhibitions/viking-animals-the-secret-of-the-settlement
Jensen, E. A., & Laurie, C. (2016). *Doing real research*. (J. Seaman & A. Owen, Eds.) (1st editio). London: SAGE publications Ltd.
Kantanen, J., Løvendahl, P., Strandberg, E., Eythorsdottir, E., Li, M. H., Kettunen-Praebel, A., … Meuwissen, T. (2015). Utilization of farm animal genetic resources in a changing agroecological environment in the Nordic countries. *Frontiers in Genetics*, *5*(FEB), 1–9. http://doi.org/10.3389/fgene.2015.00052
Kettunen, A., & Berg, P. (2017). Faroese Horse : Population status & conservation possibilities. *NordGen*.
Kjartansdottir, K. (2011). The New Viking Wave: Cultural Heritage and Capitalism, 461–480.
Koehler-Rollefson, I., & Meyer, H. (2014). Access and Benefit-sharing of Animal Genetic Resources Using the Nagoya Protocol as a Framework for the Conservation and Sustainable Use of Locally Adapted Livestock Breeds, 45. Retrieved from http://www.fao.org/WAICENT/faoINFO/AGRICULT/AGAInfo/programmes/en/genetics/documents/ITWG_AnGR_8/side-event/01_Invitation-ABS_for_AnGR_GIZ_LPP.pdf
Konijnendijk, C. C., Nielsen, A. B., Schipperijn, J., Rosenblad, Y., Sander, H., Sarv, M., … Gustavsson, R. (2007). Assessment of urban forestry research and research needs in Nordic and Baltic countries. *Urban Forestry and Urban Greening*, *6*(4), 297–309. http://doi.org/10.1016/j.ufug.2007.08.001
Kuehne, L. M., & Olden, J. D. (2015). Opinion: Lay summaries needed to enhance science communication: Fig. 1. *Proceedings of the National Academy of Sciences*, *112*(12),

3585–3586. http://doi.org/10.1073/pnas.1500882112
Leroy, G., Boettcher, P., Hoffmann, I., Mottet, A., Teillard, F., & Baumung, R. (2016). An exploratory analysis on how geographic, socioeconomic, and environmental drivers affect the diversity of livestock breeds worldwide. *Journal of Animal Science*, *94*(12), 5055–5063. http://doi.org/10.2527/jas2016-0813
Lucas, G., & McGovern, T. (2007). Bloody slaughter: Ritual decapitation and display at the viking settlement of Hofsta{eth}ir, Iceland. *European Journal of Archaeology*, *10*(1), 7–30. http://doi.org/10.1177/1461957108091480
McClain, C. R. (2017). Practices and promises of Facebook for science outreach: Becoming a "Nerd of Trust." *PLoS Biology*, *15*(6), 1–9. http://doi.org/10.1371/journal.pbio.2002020
McGovern, T. H. (2007). Landscapes of Settlement in Northern Iceland: Historical Ecology of Human Impact and Climate Fluctuation on the Millenial Scale. *American Anthropologist*, *109*(1), 27–51. http://doi.org/10.1525/AA.2007.109.1.27.28
Miller, R. J., Hanson, J., Fretz, T., & Weismiller, R. (2004). Science and education. Necessary conditions for successful agriculture and rural development, *33*(1), 55–58.
Napoleoncat.com. (2017). Facebook and Instagram user demographics in Iceland. Retrieved from https://napoleoncat.com/blog/en/facebook-and-instagram-users-in-iceland-august-2017/
Nisbet, M. C., & Scheufele, D. A. (2009). What's next for science communication? promising directions and lingering distractions. *American Journal of Botany*, *96*(10), 1767–1778. http://doi.org/10.3732/ajb.0900041
NordGen. (2017). About us - Nordgen. Retrieved March 15, 2018, from https://www.nordgen.org/en/about-us/
Nunn, E., & Pinfield, S. (2014). Lay summaries of open access journal articles: Engaging with the general public on medical research. *Learned Publishing*, *27*(3), 173–184. http://doi.org/10.1087/20140303
Ovaska, U., & Soini, K. (2016). Local Breeds – Rural Heritage or New Market Opportunities? Colliding Views on the Conservation and Sustainable Use of Landraces. *Sociologia Ruralis*, *57*(November 2017), 709–729. http://doi.org/10.1111/soru.12140
Ovaska, U., & Soini, K. (2017). Local Breeds – Rural Heritage or New Market Opportunities? Colliding Views on the Conservation and Sustainable Use of Landraces. *Sociologia Ruralis*, *57*(November 2017), 709–729. http://doi.org/10.1111/soru.12140
Purvis, R. L., Zagenczyk, T. J., & McCray, G. E. (2015). What's in it for me? Using expectancy theory and climate to explain stakeholder participation, its direction and intensity. *International Journal of Project Management*, *33*(1), 3–14. http://doi.org/10.1016/j.ijproman.2014.03.003
Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, *141*(10), 2417–2431. http://doi.org/10.1016/j.biocon.2008.07.014
Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., … Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, *90*(5), 1933–1949. http://doi.org/10.1016/j.jenvman.2009.01.001
Ruane, J. (2000). A framework for prioritizing domestic animal breeds for conservation purposes at the national level: A Norwegian case study. *Conservation Biology*, *14*(5), 1385–1393. http://doi.org/10.1046/j.1523-1739.2000.99276.x
Shirk, J. J. L., Ballard, H. H. L., Wilderman, C. C., Phillips, T., Wiggins, A., Jordan, R., … Bonney, R. (2012). Public participation in scientific research: a framework for intentional design. *Ecology and Society*, *17*(2), 29. http://doi.org/10.5751/ES-04705-170229
Søvn Landsins. (2018). Søvn Landsins. Retrieved March 14, 2018, from http://savn.fo/00053/00472/00520/00292/

Steele, T. E. (2015). The contributions of animal bones from archaeological sites: The past and future of zooarchaeology. *Journal of Archaeological Science*, *56*, 168–176. http://doi.org/10.1016/j.jas.2015.02.036

Stephenson, R. L., Paul, S., Pastoors, M. A., Kraan, M., Holm, P., Wiber, M., … Benson, A. (2016). Integrating fishers' knowledge research in science and management, *73*(6), 1459–1465.

Stewart, E. J., & Draper, D. (2009). Reporting back research findings: A case study of community-based tourism research in northern Canada. *Journal of Ecotourism*, *8*(2), 128–143. http://doi.org/10.1080/14724040802696023

Thornton, P. K. (2010). Livestock production: recent trends, future prospects. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 2853–2867. http://doi.org/10.1098/rstb.2010.0134

Unerman, J., & Bennett, M. (2004). Increased stakeholder dialogue and the internet: Towards greater corporate accountability or reinforcing capitalist hegemony? *Accounting, Organizations and Society*, *29*(7), 685–707. http://doi.org/10.1016/j.aos.2003.10.009

Visit Faroe Islands. (2018). Horse riding - Visit Faroe Islands. Retrieved March 14, 2018, from https://visitfaroeislands.com/see-do/horse-riding/

Whyte, K. P., & Crease, R. P. (2010). Trust, expertise, and the philosophy of science. *Synthese*, *177*(3), 411–425. http://doi.org/10.1007/s11229-010-9786-3

Young, J. C., Jordan, A., R. Searle, K., Butler, A., S. Chapman, D., Simmons, P., & Watt, A. D. (2013). Does stakeholder involvement really benefit biodiversity conservation? *Biological Conservation*, *158*, 359–370. http://doi.org/10.1016/j.biocon.2012.08.018

Appendix 1

Questionaire –

Basic questions

- What is your name, age, and occupation?
- What animals do you keep and how many?
- In what kind of setting do you keep your animals? E.g. in a farm on the countryside, in stables etc.
- How long have you been breeding/keeping the herd?

Motivation

- Did you get into breeding because you took over from a family member?
    - If no then how did you get into breeding?
- What is your motivation behind keeping this breed or species?
- Do you experience the response from the public about your work with the local breeds as positive, negative or neutral?
    - Can you explain why that might be?
- Why is it important to keep the Icelandic/Faroese/etc breeds?
- What is your favorite trait in the animals you keep, color, temperament or character, hardiness, products etc.?
    - Do you breed to increase this trait?
- What do you know about the origin of the breed?
- Is the purity of the species important to you?
    - What makes a pure breed different from those that aren't?
- Is it important to you that the breed is a settler or Viking breed?
    - Why?
- If settler/Viking origin is reason for keeping them, then would it change your opinion of the breed, if scientific studies found that it is NOT a settler/Viking breed?
    - How would you react if results showed that the breed can't be considered a settler/Viking breed?

Communication

- Where do you get your current knowledge about the breed?
- Do you think that scientific institutions currently are communicating with breeders sufficiently?
    - Why or why not?
    - What could they improve?
- Do you feel like scientific institutions are helping local breeders?
    - Why or why not?
- Would you like to have more information from research institutions available?
    - Through what media?
- Have you contributed to scientific studies at some point?
    - How?
    - Have you ever been asked?
- Do you think that knowledge about the local breeds should be shared with the public?
    - How?
- Do you think social media such as Facebook or twitter is a good way of sharing scientific knowledge?
    - Why or why not?
    - Could you mention the platforms you use?

Thank you

Appendix 2

Code Book

1. What Kind of breeder is she/he?

0. Not mentioned
1. Farmer small scale
2. Industrial farmer
3. Tourist
4. Hobby breeder
5. Conservation breeder
6. Breeder. Earns money on breeding and selling.

Answer:

2. How many species does the breeder have?

0. Not mentioned

1. Define kind

Answer:

3. How many does the breeder have of the focus breed?

0. Not mentioned

1. Define in numbers

Answer:

4. Her or his occupation

0. Not mentioned

1. Farmer/breeder

2. Retired

3. Works with Tourist

4. Education in agriculture or similar, define it.

5. Other, define

Answer:

a. What is the motivation of breeders for keeping local domesticates?

5. How did the person get into breeding?

0. Not mentioned
1. Took over from a family/was inspired by family
2. Started on her/his own
3. Was inspired by a acquaintance or friend
4. Was inspired by a scientist or a science related article etc. define what/who

Answer:

6. Motivation

0. Not mentioned
1. Historical/Cultural heritage
2. Genetic gene pool/diversity of the breed
3. To keep it from going extinct
4. Because of the beauty of the breed/because of the good qualities this breed has
5. Continued the work of another.
6. To improve the breed

Answer:

7. Why is it important to keep the breed for the future?

0. Not mentioned
1. History/culture
2. Because of the beauty of the breed/because of the good qualities this breed has
3. Because its important to me personally
4. Because it's special

Answer:

8. What is your favorite trait of the breed? If more than one then line them according to how much they like them. The favorite first and then the others.

0. Not mentioned
1. History/culture
2. Colours
3. Horns
4. Behavioural qualities/ Personality/individuality
5. Meat or other product
6. Gait
7. Hardiness and the way the breed has adapted to its environment

Answer:

9. How does the breeder breed?

0. Not mentioned
1. For Colours
2. For the animal product/better meat/better wool
3. For the build/physique/gait/ Hornless
4. For more offspring pr. individual
5. For character/behavior/ certain instincts
6. To keep the breed as diverse as possible, e.g. in order to avoid loosing genes.
7. To avoid genetic diseases and deformities

Answer:

10. what makes a pure breed different from other breeds/why is it important to keep this breed compared to other breeds?

0. Not mentioned
1. Mentioned: insert quote

Answer:

11. Do you know the origin of the breed?

0. Not mentioned
1. No
2. Yes Viking/settler
3. Unproven theories (Viking/settler/Shetland/Ireland etc./historical sources)
4. Other define

Answer:

12. The importance of the species being a Viking breed

0. Not mentioned
1. important
2. Nice but not important
3. Important for branding

Answer:

13. Would it change your mind if the breed turns out not to be a Viking/settler breed?

0. Not mentioned
1. Yes
2. No
3. Somewhat
4. Unsure

Answer:

b. What are the sources of breeders' knowledge regarding local domesticates?

14. Breeders gain their knowledge regarding the breed from

0. Not mentioned
1. Other breeders/farmers
2. A paper or webpage aimed at the breed or similar
3. Directly from your countries research institutions or individual

researchers
4. Reading scientific papers and books
5. By personal observations
6. From family
7. Researchers or colleagues from other countries
8. From a degree/ Work experience
9. Vets
10. Social media
11. Historical sources

Answer:

15. Which way of media communication would they prefer?

(Original question: would you like to have more information from research institutions available and through what media. This doesn't specify if it's info for the breeders or for the public. So we assume it's for both)

0. Not mentioned
1. From researchers/from a consulting service
2. Other breeders
3. Facebook and other social media
4. Documentaries/television
5. More research
6. Research made more available to them. Easy understandable reading.
7. Let the breeders take care of publishing.
8. Make a Website for the purpose.
9. Through pre existing webpages and magazines dedicated to the breeds
10. Through education
11. Radio

Answer:

c. How do breeders currently perceive the communication between themselves and science institutions?

16. How is the communication between breeders and scientific institutions?

0. Not mentioned
1. Non existing
2. Very little
3. Good

4. Good but they could do more
5. Breeders feel belittled by researchers/breeders don't feel that they are respected by researchers
6. Scientific institutions do most of the communication
7. Breeders do most of the communication

Answer:

17. Do you feel like scientific institutions are helping local breeders sufficiently?

0. Not mentioned
1. Yes
2. Yes but they could do more
3. No

Answer:

18. How does the general public perceive the domestic races

0. Not mentioned
1. Positive perception of local domesticates by the public
2. Negative perception of local domesticates by the public
3. Neither positive or negative

Answer:

19. Do you think the general public should be more involved?

0. Not mentioned
1. Yes
2. No

Answer:

d. What improvements do breeders think can be made in science communication from relevant science institutions?

20. What improvements do breeders think can be made in science communication from relevant science institutions?

0. Not mentioned
1. More research
2. Show more interest
3. Tell more positive stories in order to ruin the bad image of the breed

4. Work more with breeders
5. Become better at reporting back to breeders
6. Balance the weight/breeders often help scientists but not the other way around
7. Should have a bigger span of knowledge/should appear more professional
8. Include the public more
9. Provide counseling service

Answer:

21. Have you participated in scientific investigations?

0. Not mentioned
1. Yes
2. No

Answer:

If yes then also note whether the breeder got any feedback from the researcher: