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**PRACTICE PERSPECTIVE ON VETERINARY SERVICES
IN ESTONIA, SWEDEN AND NORWAY – A PILOT STUDY**

**PRAKSISE VAADE VETERINAARTEENUSTELE EESTIS,
NORRAS JA ROOTSIS - PILOOTUURING**

Graduation Thesis
Veterinary Medicine

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ABSTRACT

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<p>Comparative studies on organisation of veterinary services are scarce. Aim of this thesis was to gather practicing veterinarians' perspective on organisation of veterinary services in Estonia, Norway and Sweden and to evaluate survey as a study method of the subject. First part of the thesis offers background information of veterinary services in the study countries. Information for review was collected from multiple sources including statistics, interviews and national institutions. The study survey included questions on respondents' working environment, functionality of practice services and on customer prices. Survey was delivered via social media and altogether it was completed by 54 respondents. Main findings of the survey were, that practitioners in Norway and Sweden were satisfied to on call veterinary services (first aid), but majority of Estonian respondents thought that these services are too few in their country. Customer prices of veterinary practice were lowest in Estonia and highest in Sweden, but if compared to average citizen salaries, the results were closely even. Results from Norway were reflecting price levels in the countryside. The conducted survey could serve as a basis for bigger study with some modifications.</p>			
Keywords: veterinary services, veterinary practice, first aid, customer price			

LÜHIKOKKUVÕTE

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<p>Võrdlevaid uurimusi veterinaarteenuste korraldamise kohta on vähe. Lõputöö eesmärk oli koguda praktiseerivate veterinaararstide vaatenurki veterinaarteenuste korraldamisel Eestis, Norras ja Rootsis ning hinnata uuringut kui teema õppemeetodit. Lõputöö esimene osa pakub taustteavet veterinaarteenuste kohta õpperiikides. Ülevaatamiseks vajalikku teavet koguti mitmest allikast, sealhulgas statistika, intervjuud ja riiklikud asutused. Uuring sisaldas küsimusi vastajate töökeskkonna, praktikateenuste funktsionaalsuse ja klientide hindade kohta. Küsitlus viidi läbi sotsiaalmeedia vahendusel ja kokku täitis seda 54 vastajat. Uuringu peamised järeldused olid, et Norra ja Rootsi praktikud olid rahul veterinaarteenuse (esmaabi) pakkumisega, kuid enamik Eesti vastajatest arvas, et neid teenuseid on nende riigis liiga vähe. Veterinaarpraktika kliendihinnad olid madalaimad Eestis ja kõrgeimad Rootsis, kuid võrreldes kodanike keskmise palgaga olid tulemused üsna ühtlased. Norra tulemused kajastasid hinnatasemeid maal. Läbiviidud uuring võiks olla mõne muudatusega suurema uuringu aluseks.</p>			
Märksõnad: veterinaarteenused, veterinaarpraksis, esmaabi, kliendi hind			

FOREWORDS

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INTRODUCTION

The studies on organisation of veterinary services in developed countries are scarce, and comparative studies even lacking. The aim of this thesis was to evaluate, if a survey directed to practitioners would allow comparison of veterinary services in the study countries (Estonia, Norway and Sweden). Emphasis of comparisons was given to functionality of veterinary practice. First part of the thesis involves a review on organisation of veterinary services in general and in the study countries. Structure, legislation, market and availability of veterinary services are reviewed shortly by country.

Second part of the thesis consists survey results and comparison of results between the study countries. The survey was directed to practitioners and its objective was to collect information and opinions on the availability and functionality of veterinary services, and to gather customer prices of some of the most common veterinary procedures. Frequently used concepts in this study are veterinary services, on call duty (off hours work), first aid and customer price. Veterinary services are defined more closely in the review chapter. With on call duty is meant working outside the office hours, giving first aid for sick or injured animals (excluding overreached work days with pre-booked patients). On call and off hours work are used interchangeably in the study. First aid, often referred as emergency care, means veterinary care of an animal suddenly fallen ill or injured. First aid usually includes consultation, evaluation of the animal, procedures and medicines aiming to cure the animal or to get it survive for more specialised care. Customer price is the final expense of a veterinary visit for animal owner, including all veterinary procedures, equipment and materials used, taxes and costs of keeping up practice.

1. REVIEW OF VETERINARY SERVICES

1.1. Definitions of Veterinary Services

Globally, there exists a remarkable variation in national organisation of veterinary services. Veterinary services include both private and public goods, and presence of public goods means that governmental control is required at some extent (Gallacher & Barcos 2012). Most of the veterinary services are not purely private or public goods but combinations of these. Public goods of veterinary services include e.g. epidemic, zoonotic and foodborne disease control, whereas clinical services are almost purely private goods. Some research shows that veterinary services could be more efficient with smaller public contribution, but examples confirming this assumption are mainly from developing countries. (Holden 1999)

According to Smith (2001), veterinary services have four main categories: clinical services, preventive services, provision of drugs, vaccines and other related products and human health protection. Clinical services consist of treatment of diseased animals. Preventive services mean avoidance of disease outbreaks and human health protection is covered by inspection of marketed animal products.

Services under public sector responsibility often include formulation of related national policies and regulations, ensuring the health of animals (surveillance, monitoring, quarantine, quality control of drugs, emergency planning, reporting), inspection of livestock products, accreditation and monitoring of private animal health service suppliers. Services with a shared responsibility (not a sole responsibility of public or private sector) are disease diagnosis, testing and reporting, food hygiene and inspection, education and training, disease emergency response, research and animal management advice. Clinical diagnosis and treatment of animals, artificial insemination and management of herd health are usually services under the responsibility of a private sector. (Smith 2001)

The World Organisation for Animal Health (Office International des Epizooties, OIE) defines veterinary services as comprising of veterinary administration and veterinary authorities. Veterinary administration is the governmental body having authority in the whole country, implementing animal health measures. Veterinary authority means a veterinary service under the authority of veterinary administration, which operates in a specified area and is responsible for application of animal health measures. In most of the OIE countries, to which The Nordic and Baltic countries belong to, veterinary services are

supervised by ministry of agriculture and the state is responsible for risk evaluation, drafting regulations, surveillance and control relating to animal health and food safety. In most of the countries, veterinary services take responsibility of identification, export certification, import control and traceability of animals as well as laboratory services, health policing and disease prevention campaigning in the field of animal health activities. Responsibilities related to food safety are more often shared with other services (for example, human health services). Slaughter, export certification and import control of animal products are usually the sole responsibility of veterinary services. Production and distribution of animal feed and veterinary medicinal products and animal welfare are often shared responsibilities with other services. (Benet et al. 2006)

Veterinary services may get their funding from public sources, directly from customers (private companies), from donations (voluntary service) or as a combination from these sources. Usually there are several types of service providers in one country, and resources vary widely between countries. (Gallacher & Barcos 2012, Riviere-Cinnamond 2004)

1.2. Veterinary Services in Estonia

1.2.1. Structure of Veterinary Services

The Ministry of Rural Affairs (*Maaeluministeerium*) coordinates activities related to animal health and food safety together with other agricultural policy areas. The veterinary sector activities belong to the Food Safety Department of the ministry, main ones being development of national legislation, plans and measures together with organization of their implantation. (Maaeluministeerium s.a.)

The supervisory body of veterinary sector is Veterinary and Food Board (*Veterinaar- ja toiduamet*), which is responsible for implementation of all official tasks in the field. The board is having a wide scope of activities, including issuing veterinary licences, control of food safety, prevention of zoonotic diseases, border control of animals and animal derived products, supervision of animal welfare and farm animal breeding. The board has a central office in Tallinn and 15 local offices, with land divided into four operative regions. In year 2019 the board employed total 314 officials. (Veterinaar- ja toiduamet s.a.)

The Estonian Veterinary and Food Laboratory (*Veterinaar- ja toidulaboratoorium*) is the official laboratory for diagnosis of animal diseases and determination of microbiological quality of food, feed and water. It is having four laboratories around the country with central laboratory located in Tartu. In addition to animal disease surveillance and food safety control, the laboratories perform analysis from samples sent by private practicing veterinarians. (Veterinaar- ja toidulaboratoorium s.a.)

According to register of Veterinary and Food Board, 815 persons were having veterinary license in Estonia in the beginning of year 2020 (data accessed 22.1.2020). All veterinarians practicing animal healthcare are either having their own private practice or are working for a company; municipalities or other public bodies don't have obligations to organize clinical care of animals. Veterinary services have undergone quite drastic changes after the collapse of Soviet Union, and private clinics for pet animals are relatively new service in the Baltics. Veterinary practice during soviet times was largely concentrating to farm animals, farms were large and driven by the state (Schillhorn van Veen 2004). Cows are the main production animals in Estonia and, compared to Nordic countries, farms are still large and number of animals per farm high. Lots of cow houses have been modernized during the new independence and they are usually employing several persons, including own on-site veterinarians.

1.2.2. Legislation

Organisation of veterinary services in Estonia is covered in the Veterinary Activities Organisation Act (*Veterinaarkorralduse seadus*, RT I 58, 608). The act determines the organisation of state veterinary supervision (responsibility of Veterinary and Food Board, chapter 2), process of authorisation and rights and duties of authorised veterinarians (state supervisors, chapter 3) as well as licenced veterinarians (veterinarians having right to do clinical practice, chapter 5), authorisation of laboratories receiving samples from supervisors (chapter 61), duties of lay people (chapter 7), grounds for supervisory fees (chapter 71), process of appeal (chapter 8) and liability of veterinarians (chapter 9).

1.2.3. Market

According to official statistics, there were 129 enterprises in veterinary sector having 445 persons employed 2017. Turnover of these enterprises was 20.7 million euros in that year, and the turnover has been rising strongly the last ten years. Most of the veterinary enterprises in Estonia are small and employing under 10 persons. (Statistikaamet s.a.)

International clinic chains (Evidensia/IVC, AniCura) have not expanded to Baltic countries, and apparently the largest private company for pet animals in Estonia is PetCity. The company is recently having six clinics in the cities of Tallinn, Tartu, Pärnu and Rakvere. The clinic in Tallinn is having off-hours service.

1.2.4. Availability of Veterinary Services

Tallinn, the capital city, is having private small animal clinics with off-hours service. Estonian University of Life Sciences is having clinics for horses and pet animals in the city of Tartu, and these clinics are the main ones having continuous veterinary service available in southern Estonia. The services are comprehensive especially for small animals, and a lot of patients get referred to university from other clinics and by private veterinarians. The distances in Estonia are illustrated in Figure 1; the distance between Tallinn and Tartu is almost 190 km.

Availability of services in other Estonian cities is mainly limited to office hours. The government in Estonia doesn't subsidise veterinary practice, and on call services are organised by private clinics with their own expense (Pakkonen 2020).

Veterinary care of large animals outside the office hours is limited in its regional availability and scope of services. None of the horse clinics is currently having a preparedness for colic surgery, and these patients are referred to Finland or Latvia, if owner is prepared to travel with the horse. Farmers with small herds and hobby horse owners largely have to rely on local vet's ability and willingness to work outside usual business hours, if their animal gets sick night time.



Figure 1. The clinics having off-hours service are situated in the cities of Tallinn and Tartu.

Source: <https://www.globaltrade.net/map/Estonia.html>

1.3. Veterinary Services in Norway

1.3.1. Structure of Veterinary Services

Main authority of food safety, animal welfare and health in Norway is Ministry of Agriculture and Food, more precisely its Department of Food Policy. The department is managing National Veterinary Institute (*Veterinaerinstittet*) and Food Safety Authority (*Mattilsynet*). The sections for animal welfare and environment / animal health, plant health and zoonoses of the department are responsible for legislation within their fields. (Regjeringen s.a.)

The Norwegian Agriculture Agency (*Landbruksdirektoratet*) directs governmental funds for agriculture and forestry. Production animal veterinarians are eligible to get funding for farm

visits to cover travel costs. The agency is also granting municipalities to fulfil the responsibility of continuous availability of veterinary services. (Landbruksdirektoratet 2012)

The Norwegian Veterinary Institute is a reference laboratory with main activities including diagnostics, research, monitoring, risk assessment and consulting. It is having 330 employees and six offices. Contingency planning considering one health is its core task in cooperation with other national institutes. (Veterinærinstituttet s.a.)

The National Food Safety Authority (NFSA) drafts legislation and act as a consulting body for the Ministry of Agriculture and Food. It is the main supervisory institute of food production, animal health and welfare, fish farming and import/export of animals and plants. NFSA admits and controls the licences for veterinarians, fish health biologists and animal nurses. (Mattilsynet 2013)

According to official statistics, there were 1509 registered veterinarians in Norway 2019. Most of the registered companies within the veterinary practice are small and employing one or few persons, totally the number of enterprises within the sector was 499 in 2019. (Statistisk sentralbyrå s.a.) Similar to situation in Sweden, the biggest two companies of clinical practice are Evidensia with 21 clinics and AniCura with 46 clinics in Norway (situation at the beginning of year 2020). Both companies are having both well-equipped animal hospitals as well as smaller receptions.

Fish farming is a major employer in Norway, and providing working places also for veterinarians. Veterinarians in Norway can specialise to fish health via programme, which is done while working in a position related to fish health. The programme usually takes four years. Additionally to specialised veterinarians, fish farming employs fish health biologists. Similar to veterinarian, fish health biologist is a profession protected by law. Fish health biologists are allowed to prescribe medicines for fish. (Bjørshol et al. 2019)

1.3.2. Legislation

The act of 15 June 2001 No. 75 relating to Veterinarians and Other Animal Health Personnel (*Lov om veterinærer og annet dyrehelsepersonell*) authorisation, duties and rights of animal health personnel. According to section 1, state has the overriding responsibility to provide nation-wide animal health services. Section 26 includes statement that clinic duty must be established in all parts of the country: if this is not achieved by voluntary arrangements,

ministry can assign veterinarians to take part for it. Ministry has also the right to order practicing veterinarians to perform public service in emergencies (section 27). In 2007, the act has been supplemented with the municipalities' responsibility to provide veterinary services outside office hours (*Lov om endringer i lov 15. juni 2001 nr. 75 om veterinærer og annet dyrehelsepersonell*).

1.3.3. Market

According to Norwegian statistics, there were 1468 enterprises having veterinary services as their main activity year 2019. Most of these enterprises are employing 1-10 persons. Evidensia is clearly the biggest operator in Norwegian veterinary sector by having turnover of 186,7 million NOK. Åkerblå AS, company offering fish health control and hygiene inspections among other services, is holding second place in ranking. AniCura is having five of its animal hospitals and one clinic among the ten largest companies. (Statistisk sentralbyrå s.a.)

1.3.4. Availability of Veterinary Services

The main responsibility in providing continuous access to veterinary care of animals belongs to municipalities. The Norwegian Agriculture Agency is funding providers of this service each year, and in addition to continuous availability, this funding is ensuring veterinary services in remote areas of the country. Administrative work of veterinary services is getting a proportion of this funding also. The money is given to private clinics and practitioners as a contribution to travel costs and the duty to be on call, municipalities don't have hired veterinarians themselves. Municipalities have formed consortiums to organize veterinary services, and one municipality in each consortium is responsible for administrative work (Niemi et al. 2017). The number of municipalities in Norway has become smaller recently, being 356 in the beginning of year 2020. Norway is divided into 160 on call districts, and each district get around 800 000 NOK (81 200 EUR) worth of funding yearly (Hasvold 2020).

The veterinarians providing off hours service are not officials, but may get requests or orders from official bodies (namely, the Norwegian Food Authority) to perform professional tasks.

These tasks mainly consist of medical care or euthanasia of neglected animals and assistance in possible emergency situations (e.g. disease outbreaks). Veterinarians are provided financial compensation from fulfilling these kind of tasks. (Mattilsynet 2010)

Availability of small animal veterinary care is good in cities, and clinics there are well equipped. Clinics may rotate the on call service in an area of one consortium, for example in the city of Bergen the responsibility is divided for 10 small animal clinics lasting one week at a time (AniCura s.a.). Additionally to clinics in rotation, AniCura has two clinics and Evidensia one clinic open continuously. Private practitioners in countryside often provide service for both pet and production animals.

1.4. Veterinary Services in Sweden

1.4.1. Structure of Veterinary Services

There are approximately 5000 veterinarians working in Sweden, of which 2000 work in private clinics and animal hospitals. Remaining veterinarians divide for administrative, university and control (food safety) sectors. The central administrative body of veterinary sector in Sweden is the Ministry of Enterprise and Innovation (*Näringsdepartementet*), which is governing the national authorities such as Swedish Board of Agriculture (*Jordbruksverket*), The National Veterinary Institute (*Statens Veterinärmedicinska Anstalt*, SVA), Swedish Food Agency (*Livsmedelsverket*) and board of animal healthcare (*Ansvarsnämnden för djurens hälso- och sjukvård*).

The main tasks of Swedish Board of Agriculture are to monitor and analyse development of agri- and horticultural sectors, manage statistics and implement political decisions within its field. The board also admits veterinary licenses (*Jordbruksverket s.a.*). The National Veterinary Institute, SVA, is responsible for laboratory and pathology diagnostics of infectious diseases; other main activity of the institute is research focusing on zoonotic, epizootic and endemic diseases (*Statens Veterinärmedicinska Anstalt s.a.*). Swedish Food Agency is securing food safety by controlling food producers and slaughter houses, and having its own laboratory for food safety analyses (*Livsmedelverket s.a.*).

General administrative units in regional level include 21 counties led by administrative boards (*Länsstyrelsen*) and 290 municipalities. County administrative boards implement and coordinate governmental activities, these including food security and animal welfare inspections within the veterinary sector. Animal welfare is secured by inspections, which are done both by regular and notification basis by board officials. If an outbreak of infectious animal disease happens, county administrative boards are important regional operators, taking care of operative measures, information and co-operation with other veterinary authorities. Municipalities are not having direct obligations considering animals or veterinary sector in general. (*Länsstyrelsen s.a.*)

A bit under 400 persons (385 in 2019) work as district veterinarians (*distriktveterinär*). District veterinarians are part of the organisation of Swedish Board of Agriculture. District veterinarians are responsible of official veterinary services and health care of all animals outside office hours, having a pronounced role in rural areas not profitable for private companies. District veterinarians have around 80 receptions covering the whole Sweden (see Figure 2; *Distriktveterinärerna s.a.*). Because district veterinarians secure the continuous availability of veterinary services around the country, they are funded by the Swedish government. This funding is worth around 10,5 million euros per year and applicable also for private sector, but hasn't attracted much applications. The low interest is most likely explained by the conditions of funding, which require arrangement of on call service in return (Niemi et al. 2017). District veterinarians have been criticized to distort the competition because of funding they reserve (there have been several proposals about the matter for Riksdag; the Riksdag s.a.), but it seems that their role in sparsely populated areas has become even more important recently (*Svensk Veterinärtidning 2019*).



Figure 2. Receptions of district veterinarians in Sweden. Source: <https://distriktsveterinarna.se/har-finns-vi>

Most of the district veterinarians are regarded as official veterinarians, but the official status can be applied by any licenced veterinarian. Conditions for approval are Swedish legitimation and further education in the form of short courses arranged by Swedish board of Agriculture. The board also recognise the right to work as an official veterinarian. Main tasks of official veterinarians include food safety control and prevention of infectious diseases. (Jordbruksverket s.a.)

1.4.2. Legislation

Regulation of veterinary sector in Sweden consists of several detailed acts. The main one considering organisation of veterinary services appears to be the regulation on veterinary service of general economic interest (*Förordning (2009:1397) om veterinär service av allmänt ekonomiskt intresse*), that issues the responsibilities of Swedish Board of Agriculture. The veterinary services of general economic interest include participation to public service (prevention of infectious diseases), off-hours veterinary services and services in remote areas, where practice without funding would not be economically reasonable. The Swedish Board of Agriculture has the duty to sign contracts with service providers.

1.4.3. Market

There were 1614 enterprises having veterinary practice services as their main activity in 2019, biggest ones being internationally owned chain practices AniCura and Evidensia. Veterinary practice has grown strongly the last two decades, especially specialised care of pet animals; every fourth Swedish citizen has either dog or cat in the household and the number of horses per capita is among the highest globally. Whole veterinary market has been estimated to be worth around 4 billion Swedish crowns, of which Evidensia having the greatest share with 1,1 billion net turnover. Evidensia and AniCura are having the combined share of 40 % of the market and owning the majority of animal hospitals (big clinics with specialised veterinarians and equipment). District veterinarians are covering 5 % and smaller private operators rest of the sector value. (Hoffmann et al. 2017; Konkurrensverket 2018)

1.4.4. Availability of Veterinary Services

Continuous availability of veterinary services in Sweden is the responsibility of district veterinarians, but there exist also several private clinics and hospitals in cities providing first aid for animals outside usual opening times. Evidensia, being the biggest private company, is having six clinics running 24 hours a day, of which four are small animal clinics and two horse clinics (Evidensia s.a.). AniCura has three clinics continuously open and eight clinics with extended opening hours (opening hours including evenings and holidays; AniCura s.a.). Several smaller, individual clinics are working beside these two companies.

University Animal Hospital (*Universitetsdjursjukhuset*, UDS) situated in Uppsala 70 kilometres north from Stockholm is having off-hours service for small animals, horses and production animals and is the biggest reference hospital in Sweden.

Lapland is having less population than southern parts of the country, and production animals as well as horses are concentrated to south. District veterinarians have a denser network of receptions in the south than in the north, but on call districts are relatively large; driving from one end to another may take up to two and half hours even in the southern districts (Silventoinen 2020).

2. AIMS OF THE STUDY

The aim was to evaluate possibilities of a survey-based study as a method to compare veterinary services between countries. The study objectives included collection and analysis of data considering working environment, arrangement of veterinary practice and customer prices in the study countries. Beside numerical data, attention was also given for opinions and views of practicing veterinarians.

3. MATERIALS AND METHODS

3.1. Survey

The study countries were selected based on close proximity to each other in order to compare veterinary services between neighbouring countries. Norway and Sweden were chosen from Nordic countries, because despite similarities in geography, population and animal keeping, veterinary practice is organised differently in these two countries. Estonia was included from Baltic countries to represent predominantly private veterinary practice.

Because knowledge and opinions of practicing veterinarians were given a great value when planning the study, majority of information was decided to collect through a survey. Veterinary groups in social media were selected as delivery channels, as majority of practicing veterinarians in the chosen study countries are associated with them.

First part of the survey included questions of respondent's background and participation to on call duty, while second part was aimed to collect information on customer prices in each country. The survey consisted of nine multiple choice questions and seven open text questions. Multiple choice questions mainly considered respondent's working environment, and open text questions were for opinions on veterinary services in respondent's working country. Numerical answers were possible for questions of customer prices and price increments during off hours. All questions in the survey were not mandatory to answer, because some of the questions were not applicable to all survey respondents. The survey together with introductory text can be found as Appendix 1.

The survey was conducted in English and delivered via veterinary Facebook groups during March and April 2020. The involved Facebook groups were groups for small and large animal practitioners in Sweden ("*Veterinärmedicin stordjur*", "*Veterinärmedicin smådjur*" and "*Veterinärmedicin exotics*"), large animal practitioners in Norway ("*Produksjonsdyrpraksis*"), and a common group for all practitioners in Estonia ("*Vetist sõbrale*"). The rules of Norwegian small animal practitioners Facebook group "*VetForum*" did not allow delivery of the survey, which is why this group was not included to study.

The price estimates were instructed to give in respondent's local currency (euros, Norwegian or Swedish crowns). To make comparison between countries possible, Norwegian and Swedish crowns were converted to euros by using the average exchange rate from the year

2019 (Bank of Finland s.a.). The average exchange rate for Norwegian crown was 9,85 and for Swedish crown 10,59.

3.2. Interviews

One practitioner from Sweden, two from Norway and one official veterinarian from Estonia were asked complementary questions via email. These questions were addressed to clarify arrangements of publicly subsidised practice (Sweden and Norway) and funding of practice (Estonia). The information from responses was used in the review part of the study.

3.3. Data Handling and Statistical Analysis

An online programme called “QuestionPro” was used for delivery of the survey and collection of data. After responses were collected from every study country, the survey was closed and data transferred to Microsoft Excel (version 2013). Before transfer, data was filtered by countries in the QuestionPro. Only completed responses were included for further analysis. Descriptive statistics were calculated and figures and tables generated with Excel.

4. RESULTS

4.1. Background Information and Contribution to On Call Duty

The survey got totally 54 completed responses, of which 22 from Estonia, 14 from Norway and 18 from Sweden (Table 1). Completion rates were 100% for respondents from Estonia, 64% for respondents from Norway and 69% for respondents from Sweden.

Table 1. Number of responses to the first survey question “Please select the country you are working in”.

	Estonia	Norway	Sweden
N	22	14	18
Total			54

Majority of respondents were working with other veterinarians. The percentage of respondents working alone was lowest in Estonia (9%) and highest in Norway (46%), in Sweden the percentage was 39% (Figure 3). Corresponding numbers are represented in the Table 2.

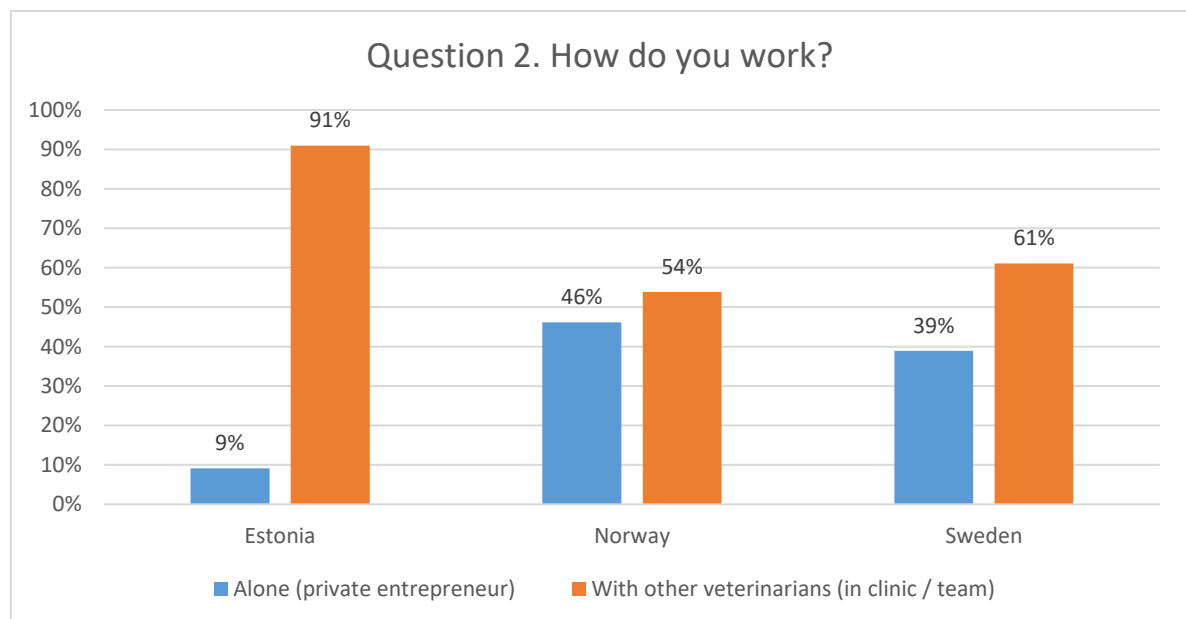


Figure 3. Responses of the second survey question by country as percentages.

Table 2. Number of responses to the second question of the survey.

Count (N)	Estonia	Norway	Sweden
Alone (private entrepreneur)	2	6	7
With other veterinarians (in clinic / team)	20	7	11
Total	22	13	18

Responses to survey question considering the type of practice respondents were doing are collected to Figure 4 and Table 3. Majority of Estonian (82%) and Swedish (56%) respondents was involved in small animal practice. Respondents from Norway were either doing production animal (50%) or mixed (50%) practice. None of the Estonian respondents was involved to mixed practice, none of Norwegian respondents to small animal or equine practice and none of Swedish respondents to production animal practice.

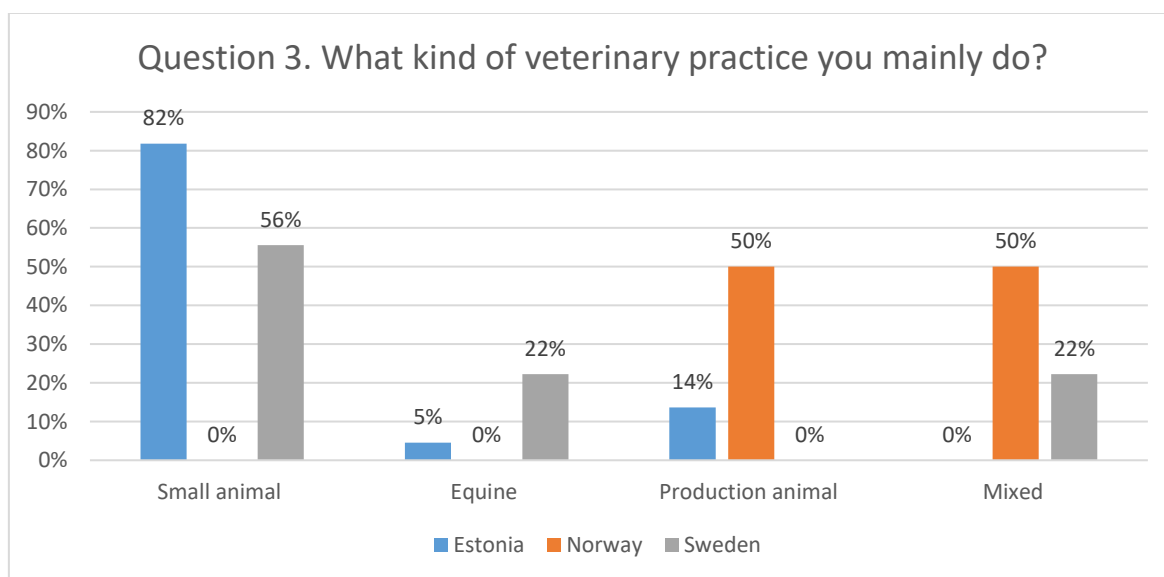


Figure 4. Responses to the third survey question considering the type of practice respondents were mainly doing.

Table 3. Number of responses to the third question of the survey.

Count (N)	Estonia	Norway	Sweden
Small animal	18	0	10
Equine	1	0	4
Production animal	3	7	0
Mixed	0	7	4
Total	22	14	18

The fourth question of survey asked, if respondents were doing private or publicly subsidised practice. Proportion of respondents doing publicly subsidised practice was lowest in Estonia (23%), corresponding percentage in Norway was 50% and in Sweden 28% (Figure 5 and Table 4).

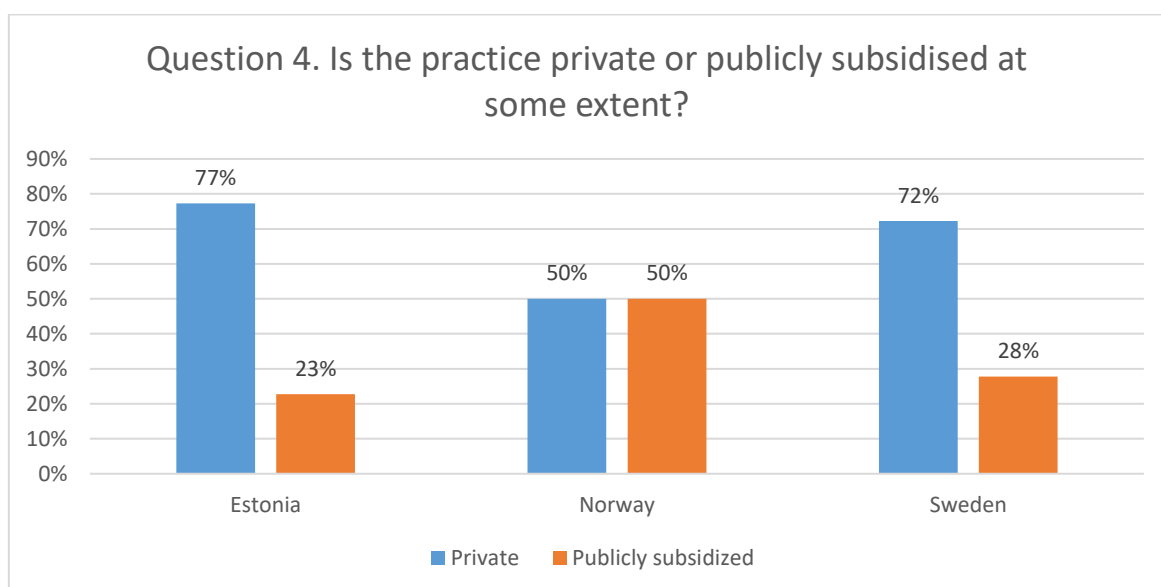


Figure 5. Proportions of respondents doing either private or publicly subsidised practice (fourth survey question).

Table 4. Number of responses to the fourth question of the survey.

Count (N)	Estonia	Norway	Sweden
Private	17	7	13
Publicly subsidized	5	7	5
Total	22	14	18

Most Estonian (77%) and Swedish (56%) respondents were working in city area, respondents from Norway were predominantly (92%) working in countryside (the fifth survey question; Figure 6 and Table 5).

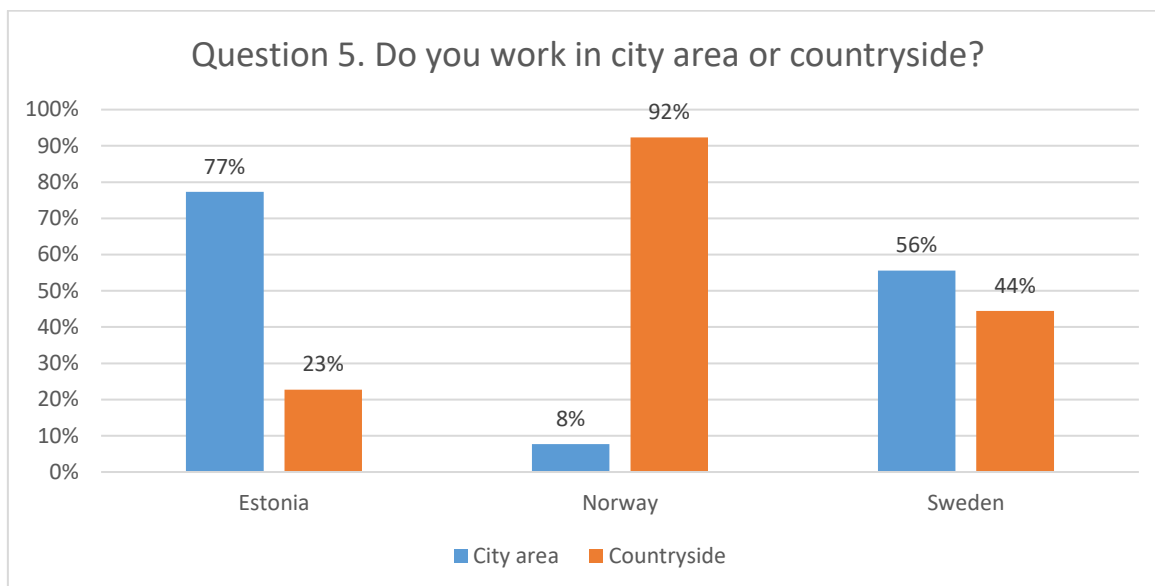


Figure 6. Majorities of Estonian and Swedish respondents were working in city area, but almost all Norwegian respondents in countryside.

Table 5. Number of responses to the fifth question of the survey.

Count (N)	Estonia	Norway	Sweden
City area	17	1	10
Countryside	5	12	8
Total	22	13	18

Responses to the sixth question are collected to Figure 7 and Table 6, question considered contribution to off-hours service (first aid on call). Almost all (93%) Norwegian respondents were taking part in off-hours service, while only 36% of Estonian respondents answered similarly. Swedish respondents were evenly divided to those who did take part and to those who did not.

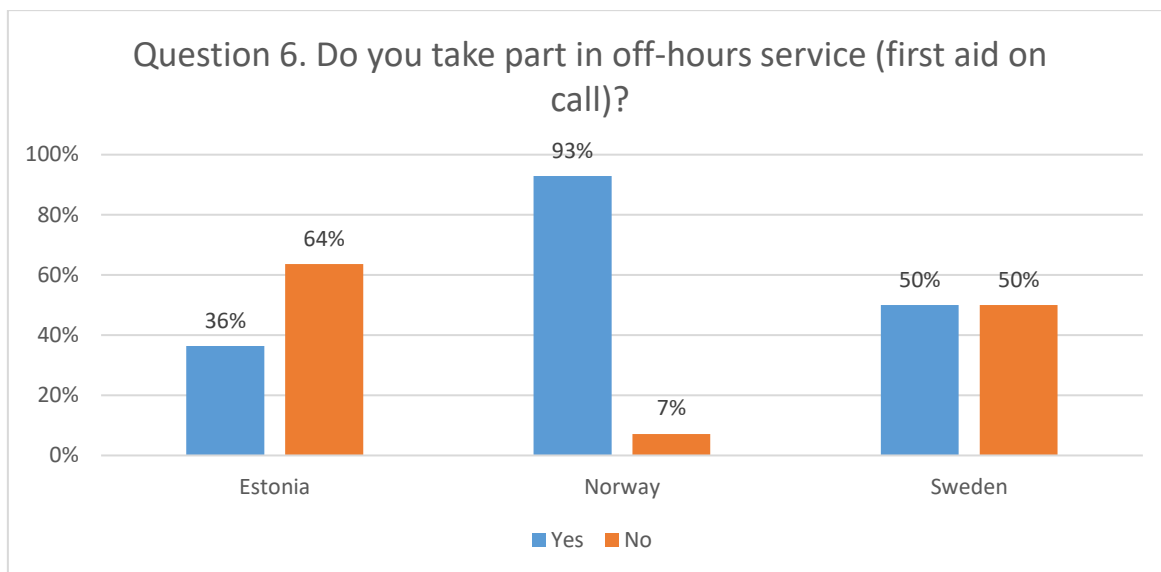


Figure 7. Proportion taking part to off-hours service was highest among Norwegian respondents. Swedish respondents divided to half and half, while 36% of Estonian respondents answered positively.

Table 6. Number of responses to the sixth question of the survey.

Count (N)	Estonia	Norway	Sweden
Yes	8	13	9
No	14	1	9
Total	22	14	18

Seventh question of the survey “If you take part in off-hours service, how often and how long (in hours) the shifts are?” was followed by possibility to respond with own words (open-text answers). The results by country are summarised below.

Estonia

Over half (64%) of the respondents were not taking part to on call service. Those who did, had really variable frequencies and lengths of on call shifts. Two respondents wrote to be continuously on call, and two respondents wrote to treat only their own patients outside office hours. Two respondents had shifts from 12 to 22 hours, one respondent had only shifts of 20 hours. Frequencies of on call shifts were once or twice a week, twice a month, and on occasion.

Norway

The frequency of on call work varied also in Norway. Many were having one day in a week and a whole weekend once a month, but some were working on call every other or third day and weekend. The length of shifts appeared to be quite even. One shift on weekday usually lasts from 4pm to 8am, totalling 16 hours, two respondents mentioned that they work usual office hours on top of these. A weekend shift was mentioned to last 64 hours (from 4pm Friday to 8am Monday).

Sweden

Two respondents wrote to have whole weekend once a month, one respondent had overnight shift twice a month, while two had this kind of shift once a week. Length of the weekend shifts ranged from 63 hours to 72 hours, while other shifts were from 8 hours to 24 hours. Two of the respondents were taking patients outside their normal working hours if needed.

Most of respondents from Norway (86%) and Sweden (88%) were satisfied to availability and quality of off-hours veterinary service in their countries, but only 29% of Estonian respondents had a similar view (the eighth survey question, Figure 8 and Table 7).

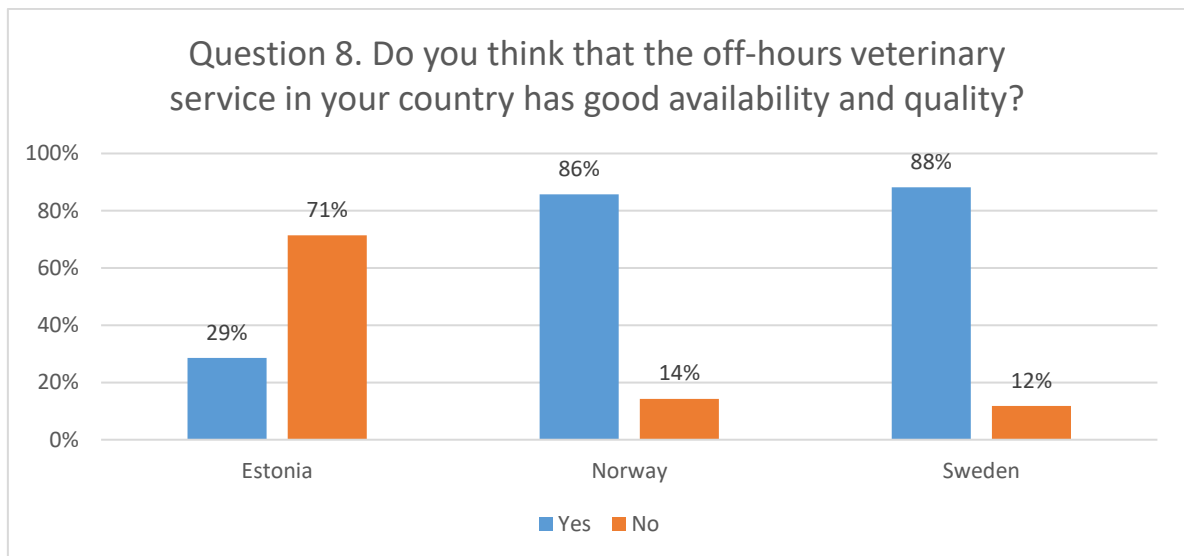


Figure 8. Satisfaction to off-hours veterinary services differed between Estonia and other study countries.

Table 7. Number of responses to the eighth question of the survey.

Count (N)	Estonia	Norway	Sweden
Yes	6	12	15
No	15	2	2
Total	21	14	17

The ninth question of the survey was a follow-up question for the preceding question. If respondent was dissatisfied to availability and quality of off-hours veterinary service, it was possible to explain this view in the open-text answer of ninth question. The responses are summarised below.

Estonia

71% of Estonian respondents were not satisfied to availability and quality of on call services in their country. Main finding from all comments was, that here are too few clinics (one in southern and a couple in northern part of the country) having this service. Few respondents wrote that more experienced veterinarians are needed for on call service, but it was also noted that these positions are currently underpaid.

Norway

Most of the respondents (86%) were appreciating the quality and availability of veterinary on call services in Norway as good. Those who did not (14%), explained that there is variation between districts, and no one working with you or backing up.

Sweden

Majority (88%) of Swedish respondents thought that off-hours veterinary service in Sweden has good availability and quality. Two respondents specified their negative opinion, other one thought that animal hospitals are too far away, while other criticised that veterinarians on call are often too inexperienced and not able to help patients in time.

4.2. Customer Prices

The second section of the survey included questions of customer prices. The respondents were asked to give an estimate of customer price for three different kind of patients, each of them described as uncomplicated and treatment time day-time. The tenth question asked customer price for treatment of a hypocalcemic cow, the eleventh question for treatment of a horse with mild colic (both 20 km drive one-way), and the twelfth question for euthanizing a middle-sized (20 kg) dog. Average prices by country are collected to Figure 9 and number of responses to Table 8.

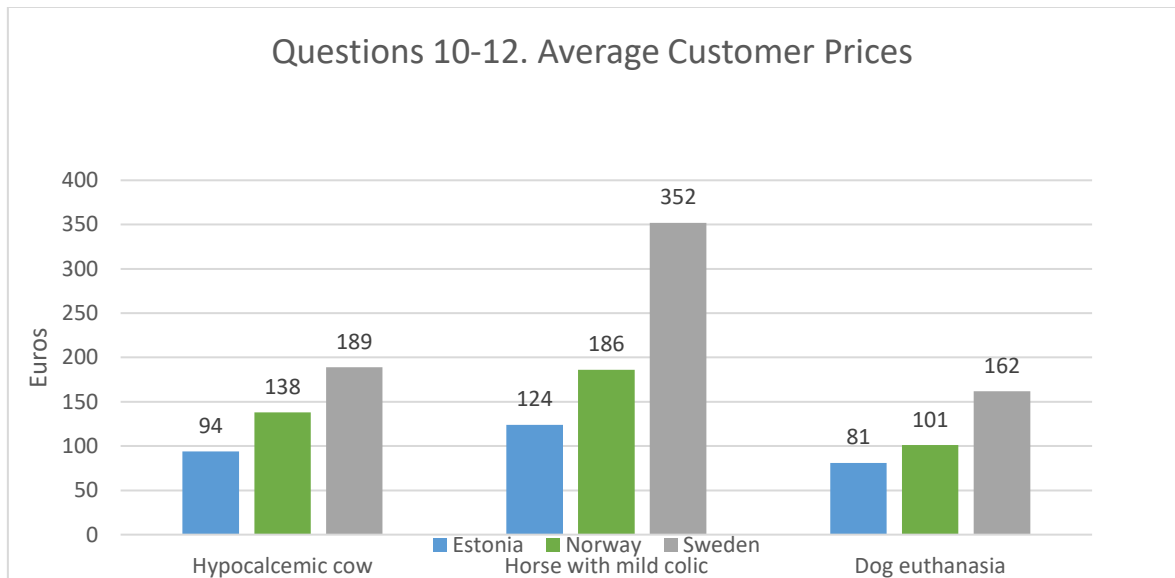


Figure 9. Averages of responded customer price estimates, Norwegian and Swedish answers converted to euros.

Table 8. Number of responses to survey questions 10-12.

Count (N)	Estonia	Norway	Sweden
Hypocalcemic cow	8	14	6
Horse with mild colic	7	14	9
Euthanasia of a dog	21	13	15

Thirteenth question of the survey was, how much the prices increase during off-hours, and respondents were allowed to give estimates in percentages. Range of estimates was greatest among Estonian respondents, from 0% to 200%. Results from Norway ranged from 50% to 100% and from Sweden from 30% to 100%. 16 respondents from Estonia, 14 from Norway and 12 from Sweden answered the question, the averages of results are represented in Figure 10.

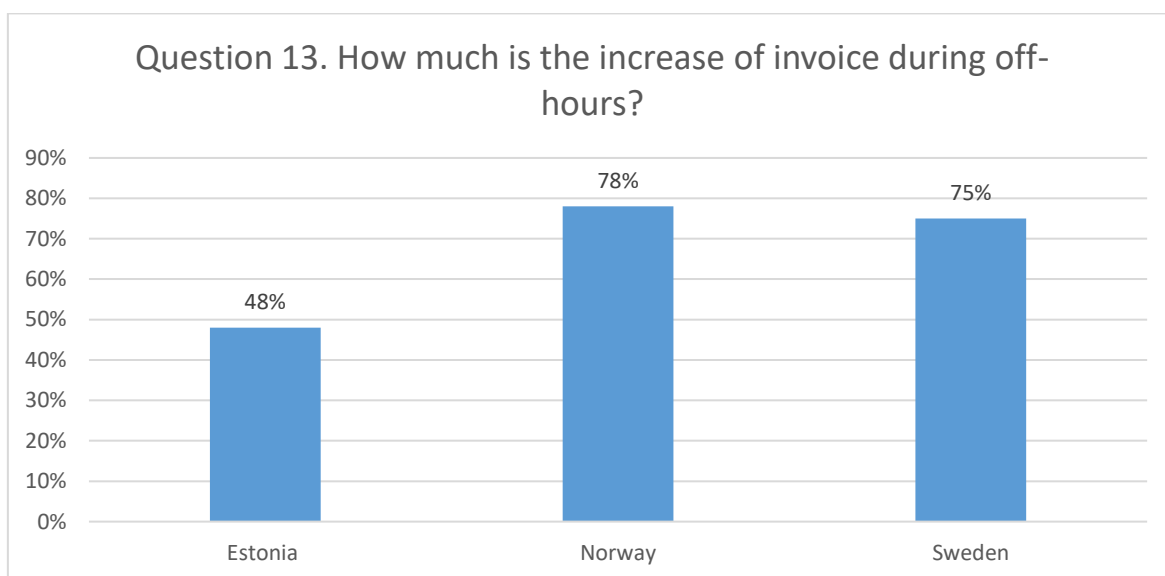


Figure 10. Average of responses to the thirteenth question of the survey. Estonia N=16, Norway N=14, Sweden N=12.

In the fourteenth question of the survey, respondents were asked to choose one customer invoice from preceding questions (either treatment of hypocalcemic cow, horse with mild colic or dog euthanasia). Majority of Estonian (82%) and Swedish (63%) chose the invoice of dog euthanasia, while most of the Norwegian respondents (71%) chose the invoice of treating a hypocalcemic cow (Figure 11 and Table 9).

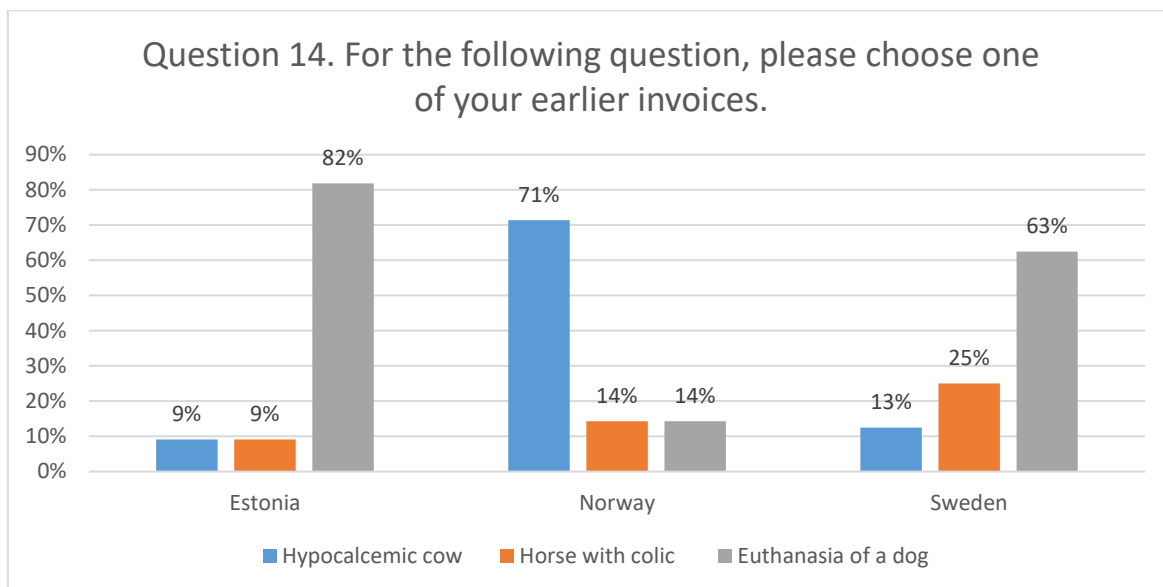


Figure 11. Percentages of respondents who chose invoice of treating a hypocalcemic cow, a horse with mild colic or dog euthanasia by country. The choice was made for the following survey question.

Table 9. Number of responses to fourteenth question of survey.

Count (N)	Estonia	Norway	Sweden
Hypocalcemic cow	2	10	2
Horse with colic	2	2	4
Euthanasia of a dog	18	2	10
Total	22	14	16

After choosing one invoice, respondents were asked to sort the components of this invoice from biggest (5) to smallest (1) share of total sum. The given components were price of procedure, price of medicines, price of equipment and materials, visit fee and price of driving to patient. The answers are collected to Figures 12, 13 and 14.

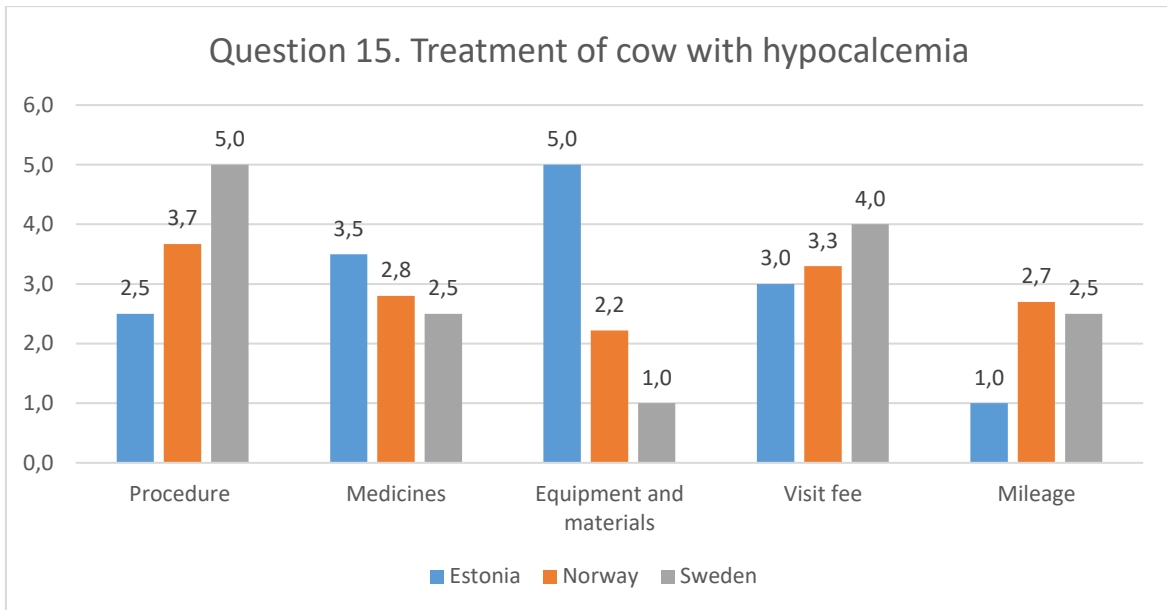


Figure 12. Components of invoice for treatment of a hypocalcemic cow. Swedish (N=2) and Norwegian (N=10) gave higher values to procedure and cost of driving than Estonian (N=2) respondents.

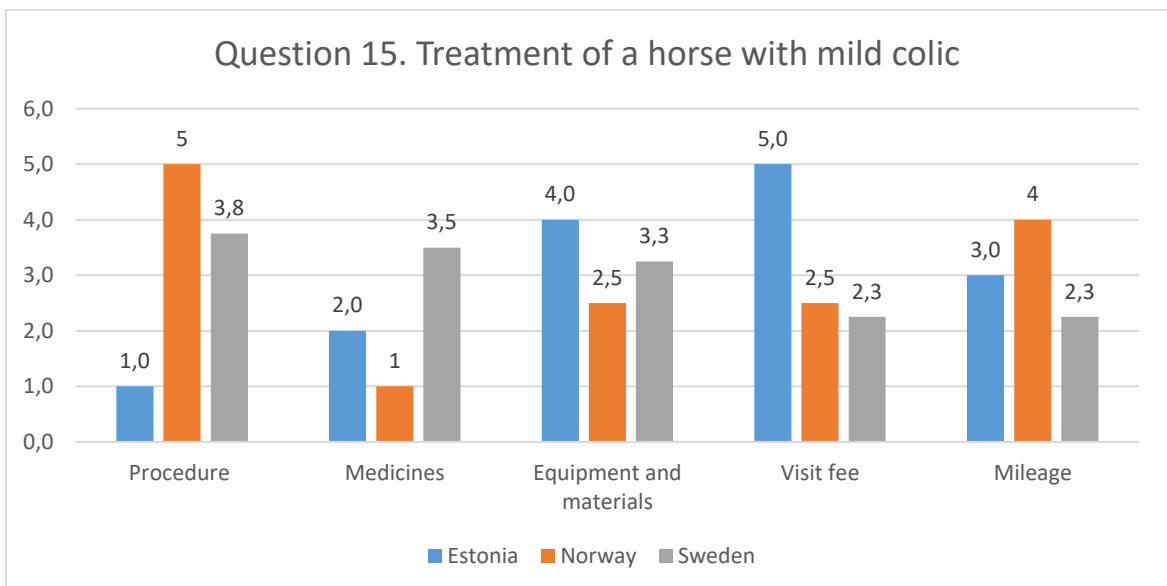


Figure 13. Components of invoice for treatment of a horse with mild colic. Estonian respondents (N=2) gave higher value to equipment and materials and visit fee than Swedish (N=4) or Norwegian (N=2) respondents, but lower value for procedure.

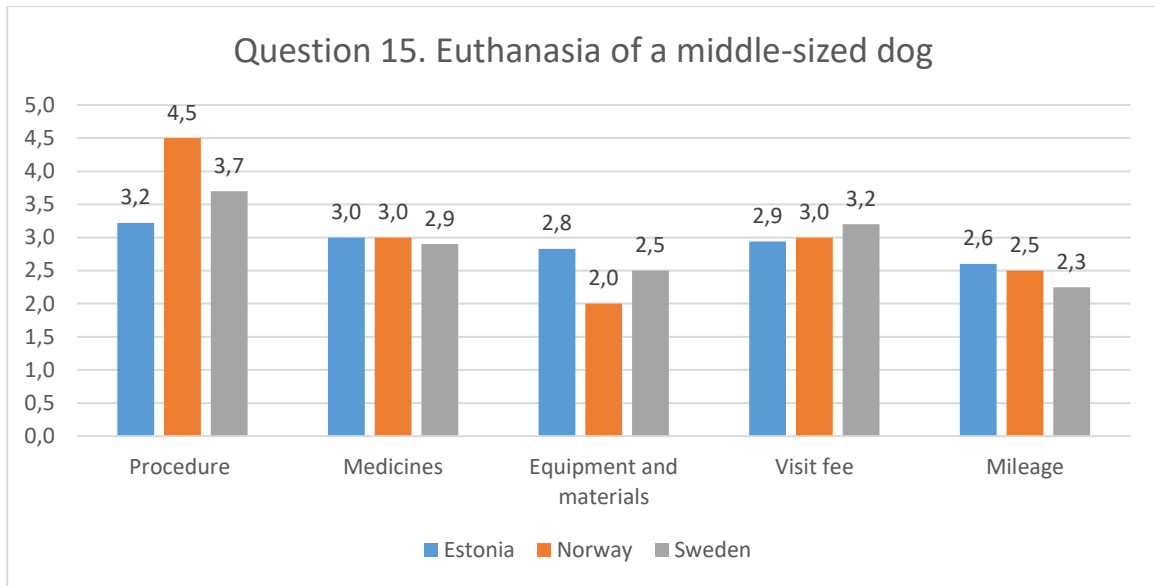


Figure 14. Components of invoice for euthanasing a middle-sized dog. The results were closely even both between components and between countries. Estonia N=18, Norway N=2, Sweden N=10.

Respondents from Norway and Sweden were generally satisfied to price levels of veterinary services in their country; Estonian respondents the question divided to half (the sixteenth question of the survey, Figure 15 and Table 10).

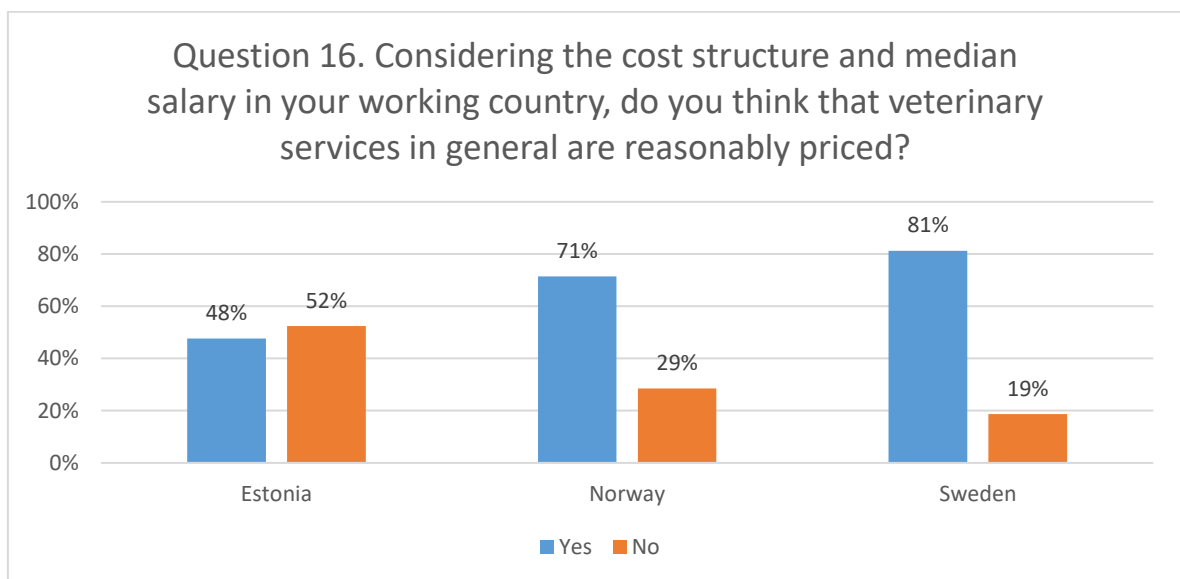


Figure 15. Percentages of answers for the sixteenth survey question.

Table 10. Number of responses to the sixteenth question of the survey.

Count (N)	Estonia	Norway	Sweden
Yes	10	10	13
No	11	4	3
Total	21	14	16

In the last question of the survey (the seventeenth question), respondents were asked to explain their negative answer to the preceding question considering general pricing of veterinary services in their country. The open-text responses are summarised below.

Estonia

The last question of survey divided Estonian respondents to half, 52% thought that veterinary services in general are not reasonably priced in their country. Eight respondents clarified their opinion, of which five thought that veterinarians are paid too little. Two respondents told that procedures are (sometimes) too expensive.

Norway

71% of respondents thought that veterinary services in Norway are reasonably priced. The respondents that were having opposite opinion, clarified that the prices are too low, especially considering the length of veterinary education.

Sweden

Of all respondents, 81% thought that veterinary services in general are reasonably priced in Sweden. Those who had the opposite opinion were given opportunity to explain their view in an open text box; all of them thought that the prices are too high.

It was voluntary to enter an e-mail address at the end of the survey. Some of the respondents were contacted by e-mail to answer questions provided by the author of the study. Questions were set to clarify arrangements of veterinary services in the study countries, replies were utilised in the review part of the study (personal communications; see list of references).

5. DISCUSSION

5.1. Background Information and Contribution to On Call Duty

Most of the Estonian respondents were doing small animal practice, while Norwegian respondents were involved to production animal and mixed practice. Swedish respondents divided to all branches of practice, with half of them working with small animals. Linked to type of practice, majority of Estonian respondents were working in cities with other veterinarians, while Norwegian respondents were mainly working in the countryside, half of them with other veterinarians. Two thirds of Swedish practitioners were working with others; district veterinarians can be perceived as team work, because receptions are typically shared by few veterinarians. Small proportions of Estonian (23%) and Swedish (28%) respondents had a work place subsidised at some extent, while of Norwegians this proportion was 50%.

Participation to on call service was highest among Norwegian respondents (93%) and lowest among Estonian respondents (36%), half of the Swedish respondents was participating. Lengths and frequencies of on call shifts were variable in all three countries. Satisfaction for quality and availability of on call veterinary services was considerably lower in Estonia than in Sweden or Norway, Estonian respondents explained dissatisfaction arising from poor availability of this service outside cities.

5.2. Customer Prices

All prices were highest in Sweden and lowest in Estonia. Even though the results are quite consistent, the background of Norwegian respondents (production animal/mixed practice) should be considered when comparing the results.

The responded customer prices of a dog euthanasia were compared to prices found from internet. Prices from survey were higher than prices in official webpages in Estonia and Sweden but lower in Norway. The average price from ten randomly chosen clinic websites in Sweden was 1 082 SEK (102 EUR), while survey result average was 1 720 SEK (162 EUR). The corresponding numbers for Estonia were 59 and 81 euros, and for Norway 1 310 NOK (133 EUR) and 999 NOK (101 EUR). These differences might be explained by several factors, e.g. internet prices including only procedure and not a visit fee, or respondents may

have regarded 20 kg dog as a big dog (usually the price of euthanasia is higher for big animals), or have included cremation to estimated price. The difference in prices from Norway might be explained by the fact that the study respondents were doing practice in countryside, where prices tend to be generally lower than in cities.

Comparison of prices between the study countries become more reasonable by representing them as percentages of monthly income. The average monthly income of one person in Estonia was 1 407 euros in year 2019, corresponding incomes were 34 600 SEK (3 100 EUR) for Swedish and 47 290 NOK (4 500 EUR) for Norwegian people (Statistics Estonia 2020; Statistiska centralbyrån s.a.; Statistisk sentralbyrå s.a.). The average survey prices of dog euthanasia were 81 euros in Estonia, 1 720 SEK (162 EUR) in Sweden and 999 NOK (101 EUR) in Norway. For Estonian people, this survey average of dog euthanasia makes 5.8 % of monthly income; corresponding percentages for Swedish and Norwegian people are 5.2 % and 2.1%. Again, the result from Norway can be seen as representing prices in countryside, which possibly explain the difference to other countries.

Comparison of prices between private and publicly subsidised sectors could be a part of larger study. The publicly subsidised veterinarians and clinics in Norway are private entrepreneurs and free to set their own prices, but district veterinarians in Sweden work under the national authority (Swedish Board of Agriculture) and have a more uniform price list.

The structures of customer prices were having some variation between countries. The Swedish veterinarians were giving a lot of weight to procedure and visit fee in all three patients (dog euthanasia, hypocalcemic cow and horse with colic). The cost structure of dog euthanasia in Estonia was estimated to consist of almost equally from the five given price components. There were only few respondents for large animal prices from Estonia, but those who responded, gave high values for equipment and materials and low values for procedures. Norwegian respondents gave high values for procedures in all cases.

Respondents from Norway and Sweden were satisfied to prices in general. Norwegian respondents with negative answer thought that prices are too low, but Swedish respondents with similar view thought that prices are too high. Most of Estonian respondents with negative response thought that veterinarians are not paid enough, some of them explained that prices are too low.

5.3. Study Limitations

Main study limitations arise from small number of responses and different working environments of respondents. Most of the respondents from Norway were working in production animal or mixed practice in countryside, while majority of Estonian respondents were working with small animals.

There turned out to be different ways to understand some of the study questions, and some of them could have been phrased more straightforward. Regarding the cost of dog euthanasia, respondents might have misunderstood the word “mileage”, as it was included to customer invoice as an expense (the dog was meant to be treated in veterinarian’s reception (clinic), without any cost of driving to patient). Respondents may also have included different procedures, medicines and materials for the three cases in the survey - for example, procedure of treating a horse with mild colic can include only clinical examination and pain medication, or alternatively also intubation with nasogastric tube and rectal examination. The length and frequency of on call shifts was an open-text question, and hence the results difficult to compare between countries.

Comparison of veterinary customer prices is difficult in general, as many factors contribute to the final price of a veterinary visit. The final price is dependent on factors related to patient (age, general health, size), to clinic (equipment, location, rent and other running costs) and to veterinarian (experience and specialization). National taxation, possible subsidies, general price level of services, service demand and competitive situation between service providers complicate the comparison of prices between countries. Availability and cost of labor can also increase or decrease prices. The survey questions were set to eliminate some of these factors and some of them have been taken into account when comparing results, but it was not possible to eliminate all of them.

6. CONCLUSIONS

Differences between the study countries appeared in the organisation and funding of veterinary practice. Practice services are publicly subsidised in Norway and Sweden, as national regulations require organisation of these services by public bodies. Municipalities in Norway are funding private veterinarians to take part in on call service, while in Sweden the availability of services is secured by practitioners working in the organisation of district veterinarians. Government of Estonia is not funding veterinary practice.

Respondents from Sweden and Norway, where veterinary on call services are publicly subsidised, were generally satisfied to availability and quality of these services. In Estonia these services are arranged by private clinics, and half of the respondents were dissatisfied to availability, which is confined to two of the largest cities (Tallinn and Tartu).

Despite differences in organisation of veterinary practice, some of the complaints were similar in the study countries. Both Estonian and Norwegian respondents thought that veterinarians are not paid enough, especially considering on call service.

Main finding from customer price structure was the difference in estimated value of procedures. Both Swedish and Norwegian veterinarians gave high values for the human work, while Estonians valued other factors generally higher.

The estimated customer prices were highest in responses of Swedish veterinarians. As the respondents were having different working environments and number of respondents was relatively small, definite conclusions cannot be drawn, but the results offer a preliminary insight of price levels.

A larger study with more detailed questions and greater number of respondents would allow more precise conclusions, especially considering customer prices.

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APPENDICES

Appendix 1. Introductory text and survey questions as they were published online.


Veterinary Services Survey

I'm studying veterinary medicine in Estonia and preparing my thesis on veterinary services in Baltic-Nordic region - more specifically in Estonia, Sweden and Norway. Even though the study countries are geographically closely located, the veterinary services are differently funded and arranged. The aim of this survey is to collect information on the practice cost structure and opinions on the functionality of veterinary services in the study countries.

All answers are well appreciated, but if some of the questions don't apply to your work, you can leave the answering space blank and hop on to next question.

All of your answers will be handled anonymously and with confidence. If you have questions considering this survey, you are welcome to e-mail me at lotta.raunio@student.emu.ee

Please select the country you are working in.

How do you work?

- Alone (private entrepreneur)
- With other veterinarians (in clinic / team)

What kind of veterinary practice you mainly do?

- Small animal
- Equine
- Production animal
- Mixed

Is the practice private or publicly subsidized at some extent?

- Private

Publicly subsidized

Do you work in city area or countryside?

City area

Countryside

Do you take part in off-hours service (first aid on call)?

Yes

No

If you take part in off-hours service, how often and how long (in hours) the shifts are?

Do you think that the off-hours veterinary service (first aid on call) in your country has good availability and quality?

Yes

No

If you answered "No" to previous question: what would you like to change?

The remaining questions consider the customer prices and cost structure of veterinary practice. You can give the estimates in your local currency (euros / Swedish or Norwegian crowns).

How much would you charge for treating a cow with hypocalcemia?

Please give an estimate of total price for customer, assuming day-time visit in a usual working day and uncomplicated patient with 20 km drive one-way.

How much would you charge for treating a horse with mild colic?

Please give an estimate of total price for customer, assuming day-time visit in a usual working day and uncomplicated patient with 20 km drive one-way.

How much would you charge for euthanizing a middle-sized (20 kg) dog?

Please give an estimate of total price for customer, assuming day-time visit in a usual working day and uncomplicated patient.

How much is the increase of invoice during off-hours (evening, night, weekend)?

You can give a rough estimate in percentages.

For the following question, please choose one of your invoices from earlier questions.

- Hypocalcemic cow
- Horse with colic
- Euthanasia of a dog

Of your chosen customer invoice, please sort the expenses below into order from biggest (5) to smallest (1) share of total sum.

Procedure

-- Select --



Medicines

-- Select --



Equipment and materials

-- Select -- ▼

Visit fee

-- Select -- ▼

Mileage

-- Select -- ▼

Considering the cost structure and median salary in your working country, do you think that veterinary services in general are reasonably priced?

- Yes
- No

If you answered "No" to previous question, please explain your opinion.

Last but not least: if you feel comfortable to possibly answer some extra questions regarding this subject, you can provide your e-mail address below. This is fully optional and your address won't be used for anything else.

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signature

In Pirkkala, Finland **18.05.2020**

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This is to confirm that the final thesis is allowed for defence.

Arvo Viltrop

Supervisor's name and signature

Arvo Viltrop

18.05.2020

Date

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signature

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Kajsa Hakulin

Supervisor's name and signature

Kajsa Hakulin

18/05/2020

Date