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Faculty of Veterinary Medicine and Animal Science

The welfare of dogs in Sweden, assessed from official animal welfare control

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Degree project

Department of Animal Environment and Health
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Abstract

Dogs have a high popularity among pet owners in Sweden. Dog daycare and boarding establishment care for dogs when owners are at work or travel. These professional establishments require a license to conduct commercial activities.

Compliance with Swedish and EU legislation pertaining to the welfare of animals is routinely assessed by educated inspectors. Complete data from official animal welfare control of premises with dogs in Sweden (21 counties), from January 2012 to December 2014, was provided by the Swedish Board of Agriculture. The objectives of the study were to identify missing data on dog welfare from the animal welfare control database; to determine the occurrence of poor welfare in general, and between professional and non-professional premises that keep dogs; to investigate whether the welfare status of dog daycare/boarding can be determined using the animal welfare control database; and recommend improvements for assessment, especially for dog daycare/boarding in Sweden.

A species specific animal welfare checklist was used to assess compliance with legislation pertaining to the welfare of dogs. There were 40 control points based on animal, resource, and management-based measures on the animal welfare checklist. There were only four animal-based control points assessing social contact, cleanliness and grooming of the animals, body condition, and claw condition.

During the study period it was found that there were a total of 17,660 premises registered with the Swedish Board of Agriculture. Eleven percent of these premises were registered as a professional establishment. The total number of inspections from 2012 to 2014 was 9245. Reasons for inspection included normal routine inspections 600, because of a complaint by the general public, veterinarian or other 5893, due to follow-up of a previously identified deficiency 1707, or because of an application for a permit to conduct a commercial activity 1045.

Findings from this study have demonstrated that the most frequent animal-based welfare issues were for inadequate claw condition (19% non-compliant), followed by body condition (15%). The highest percentage non-compliant resource or management-based CPs were design requirements for dog yards (45%), followed by requirements for protection from inclement weather (e.g. strong heat, precipitation, humidity, wind and cold) while outdoors (29%). Also shown to have greater than 10% non-compliance were requirements for the regularity and length of walks, the facility cleanliness, space dimensions, environment and species-specific enrichment; and access to clean drinking water.

I was able to determine significant differences in welfare between professional and non-professional establishments; however data was lacking on the type of professional establishments, and therefore dog daycare and boarding facilities were not easily identifiable.

Improvements to the official animal welfare control database are recommended. The animal-based measures and the methods used to record them should be standardised; monitoring protocols should be improved by including factors that may have positive and negative effects on the animal welfare; the dog welfare checklist should have more animal-based CPs; data collection should be standardised; checklists should be more adapted for daycare and boarding establishments, and to create one common gold standard for dog welfare control.

Keywords: animal welfare, dog welfare, welfare assessment, dog daycare.

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Abbreviations

AWIN	Animal Welfare Indicators
CI	confidence interval
CP	control point
EFSA	European Food Safety Authority
FAO	Food and Agriculture Organization of the United Nations
OIE	World Organisation for Animal Health
JV	Jordbruksverket; Swedish Board of Agriculture
OR	odds ratio
EFBA	European Fur Breeders Association
TV	a full cross-compliance control (TV=tvärkontroll in Swedish)
SKK	Swedish Kennel Club (Svenska Kennelklubben)
WelFur	the animal welfare project on fur-farmed species
RSPCA	Royal Society for the Prevention of Cruelty To Animals
IQR	inter quartile range

1 Introduction

1.1 Background

Nowadays dogs are a very popular pet in Sweden. According to the Swedish Board of Agriculture, there were 816,575 dogs registered in Sweden in 2015. This number has a tendency to increase and is updated monthly (Jordbruksverket 2016).

There is variation in the way dogs are used and kept, for example some of them spend their time alone, unable to contact with others of their own species, on cosy sofas while others play with other dogs at daycare 5 days a week. There are also breeding kennels where dogs are able to communicate with close relatives. Sled dogs are usually kept in groups outside and they have an active life style. Whereas hunting dogs are used for purpose seasonally and the rest of the time they spend as a companion animal (Svartberg et al., 2002).

The reason why the welfare of dogs is important is because they are living creatures and they have their own rights and freedoms. Animal rights and freedoms were discussed a lot in public (Rowlands et al., 2013; Nash et al., 1989; Sunstein et al., 2004; Aaltola et al., 2011).

Whether animals could feel pain was a contentious issue for a long time (Harrison et al 1991; Rollin et al 1989). Nowadays we know that animals have feelings and can suffer from pain therefore unreasonable suffering should be avoided (Bateson et al., 1991; Weary et al., 2006).

There are a lot of animal rights and protection organizations in the world. However animal rights and freedoms are not always the same. Some countries have more strict rules and laws that apply to animals while others do not have any restrictions on animal use (Mille et al 2009).

Sweden is a country with good welfare conditions for animals. Both agricultural animals and pets have their own rights and freedoms and they should be protected against violence (Sveriges Riksdag, 2014).

The Swedish Board of Agriculture requires that operations keeping dogs be registered and inspected. Inspections are conducted by educated animal welfare inspectors on behalf of the County Administrative Boards. There are official animal welfare control checklists that are specialised by species. Checklists include – management, resource, and animal based questions (control points).

Due to the fact that dogs are kept in very different environments in Sweden it is hard to have a good questionnaire that covers all welfare aspects and possible issues. This is because dog behaviour differs among dogs that are kept in different environments and/or used for different purposes (Svartberg et al., 2002).

Dog daycare and boarding establishments have a high demand among dog owners in Sweden. Lack of time between dog owners and restrictions stated by Swedish animal protection law - dogs must be walked every 6th hour and have to be supervised at least twice a day - increase interest in keeping dogs at daycare/boarding places - (Lag om tillsyn över hundar och Katter 2007). People can leave their pets at daycare or boarding places while they work or travel. It is important to know that their pets are kept in good conditions and that they are also handled with care. Therefore, it is important that animal welfare control is conducted at dog daycare/boarding facilities.

1.2 Objective, purpose and hypothesis

Compliance with Swedish and EU legislation pertaining to the welfare of dogs in Sweden is assessed against a species-specific checklist based on points outlined in the Animal Welfare Act (1988), the Animal Welfare Ordinance (1988), the Act on the Supervision of dogs and cats (2007), and the Regulation on the Supervision of Dog (2007). There is no checklist specific to dog daycare and boarding establishments that is used in Sweden nowadays, however, there is a general dog welfare checklist, that includes general control points (CPs), but this contains only four CPs specific to the keeping of dogs at dog daycare and boarding establishments such as CP-27 assess if knowledgeable staff is available during the time the dog was staying at the establishment, CP-28 assess if the dogs can go away from each other, CP-29 assess if the requirement about the muzzle is met, and CP-30 assess if the person who runs dog daycare or boarding place has an education or equivalent experience. Therefore some important animal health and welfare issues may

not be identified. As a consequence the inspectors may collect incomplete information about the dog's welfare at businesses that care for dogs. Because of these reasons there may be a negative impact on the dog's welfare at dog daycare/boarding facilities. The interest for dog care places is high in Sweden, especially in the most populated towns (Bengtsson et al., 2016). Therefore it will be valuable to create a well-adapted dog welfare checklist for such purposes.

In this masters thesis I have four primary objectives:

1. To investigate whether the welfare status of dog daycare/boarding establishments can be determined using the Swedish official animal welfare control database.
2. To determine the occurrence of poor welfare in general, and between professional and non-professional premises that keep dogs.
3. To investigate the extent of missing data on dog welfare from the official animal welfare control database; and
4. To recommend improvements for assessment, especially for dog daycare/boarding in Sweden.

The primary hypothesis of this thesis is that overall the welfare of dogs in Sweden has few problems, and in general the welfare of dogs improves over the study period. It may also be hypothesised that there is a lack of official animal welfare control specific to dog daycare/boarding in Sweden.

Since there is only data from a common checklist for pets for 2010 and 2011, it may be difficult to find data for only dogs. But for 2012 to 2014 there is adequate data for the study, thus I only analyse the data for this period.

2 Literature review

2.1 Animal welfare definitions

There is no clear definition for animal welfare as it has changed over the years. The Five Freedoms concept is commonly used for monitoring and assessment of animal welfare (Brambell et al., 1965; FAWC 1992). The idea of Five Freedoms was firstly introduced by Brambell in 1965 with the Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems. It was said that agricultural animals should be able "to stand up, lie down, turn around, groom themselves and stretch their limbs" (Brambell, et al 1965). Since Brambell has presented his report for the first time, many years have passed, and it may be concluded that the welfare of farm animals has significantly improved thanks to that report (FAWC 2009b).

Brambell's Five Freedoms have been changed though nowadays we use an improved version of them, where the Five Freedoms are defined as (FAWC 2009a):
"*1*. ***Freedom from Hunger and Thirst*** - by ready access to fresh water and a diet to maintain full health and vigour.

2. ***Freedom from Discomfort*** - by providing an appropriate environment including shelter and a comfortable resting area.

3. ***Freedom from Pain, Injury or Disease*** - by prevention or rapid diagnosis and treatment.

4. ***Freedom to Express Normal Behaviour*** - by providing sufficient space, proper facilities and company of the animal's own kind.

5. ***Freedom from Fear and Distress*** - by ensuring conditions and treatment which avoid mental suffering."

Improvement of animal welfare is a meaningful issue for public, politics, and media over the world (Bennett et al., 2012). However, different groups have different viewpoints on animal welfare. For instance governmental associations, and associations closely related with animals may have quite different thoughts on the animal welfare improvement. The World Organisation for Animal Health (OIE) has a lead role in international animal welfare model that has been introduced into countries with little knowledge about animal welfare (Bayvel et al., 2012).

The OIE has defined animal welfare from a policy viewpoint (OIE 2002): "*Animal welfare is a complex international public policy issue, with important scientific, ethical, economic, cultural, religious and political dimensions and which also raised important international trade policy considerations*."

In addition to the previous definition of animal welfare, the OIE developed a new definition based on scientific aspects (OIE 2011): "*Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment*."

2.2 Animal welfare assessment

There are many organisations and projects that have developed protocols for the assessment of animal welfare. They include organisations such as the European Food Safety Authority (EFSA), the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) mentioned above, and projects such as Welfare Quality (Blokhuis et al., 2003), Animal Welfare Indicators (AWIN) (AWIN, 2016), the animal welfare project on fur-farmed species (WelFur) (Fur Europe, 2016), and animal transport project (Wageningen Ur - For quality of life, 2016). Some of these specific projects are detailed below.

European Food Safety Authority

EFSA is an organisation that carries out scientific work and one of the organisations objectives is to implement a standardised framework for animal welfare assessment. EFSA *et al.* (2012) has published a scientific opinion about the use of animal-based measures to assess the welfare of animals. It has been concluded that it is of great importance for the systematic collection of standardised field data on animal-based measures to be conducted. As well as this, it is important that animal-based measures are species specific. The systematic collection of field data on animal-based measures and subsequent storage in well-defined databases can improve animal welfare assessment (EFSA et al., 2012).

Welfare Quality

Welfare Quality is based on practical strategies to improve animal welfare by creating a gold standard for animal welfare assessment (Blokhuis et al., 2003).The project is based on animal welfare assessment by animal-based measures that can be observed during regular farm visit by an inspector. The project suggested four principles such as good feeling, appropriate behaviour, good health and good housing (Blokhuis et al., 2010). The project proposed 12 animal-based criteria such as absence of prolonged hunger, absence of prolonged thirst, expressing social behaviour, expressing other behaviour, good human-animal relationship, positive emotional state, no injuries, no disease, no painful management procedures, ease of movement, comfort around resting, and thermal comfort.

Welfare Quality has been used as a basis for animal welfare assessment by many others, for example Botreau *et al.* 2009 suggested a model where measures performed in the Welfare Quality could be presented as value scores. EFBA has developed WelFur a successful welfare assessment program specific for fur animals based on Welfare Quality principles and criteria described above (Fur Europe, 2016; Mononen et al., 2012). Animal transport project is also based on Welfare Quality and it assesses the welfare of animals for slaughter from readying for transport up to slaughterhouse (Wageningen Ur - For quality of life, 2016).

Food and Agriculture Organization of the United Nations

The FAO is an organisation that works to make agriculture more productive and sustainable with care for the health and wellbeing of the animals (FAO, 2016). FAO *et al*. 2008 believes that the scientific assessment of animal welfare is meaningful for good animal welfare. According to the FAO welfare assessment should include multiple variables and criteria.

Animal Welfare Indicators

The AWIN project's overall aim is to improve animal welfare by developing, integrating and spreading information about animal welfare indicators. Identification and assessment of pain are highlighted in the project (AWIN, 2016).

Welfare assessment for pets

There are different kinds of pet welfare assessment, assessment by specific animal welfare organisations and of shelter animals.

Assessment by specific animal welfare organisations includes, for example, the UK has measured companion animal welfare by animal welfare indicators such as the number of unwanted healthy animals and the number of non-microchipped dogs taken into RSPCA care, the number of healthy dogs being euthanized due to irresponsible pet ownership, and the number of organised animal fights, that illustrate animal's state (RSPCA, 2009).

Assessment of shelter animals includes, for example, the Shelter Quality Project that has developed the Welfare Assessment Protocol for Shelter Dogs for assessing dog welfare in long term shelters (Barnard et al., 2014). The protocol is based on the Welfare Quality project's welfare principles (Blokhuis et al., 2010). The assessment of shelter animals may be applied to dog daycare and boarding facilities because of similarities in the environment and species.

Welfare assessment at dog daycare/boarding establishments

There is little scientific research about dog welfare assessment at dog daycare and boarding establishments, however daycare and boarding establishments are kept in similar distinct conditions to those at dog shelters or kennels such as in a new environment, possible changes in the daily regime, and contact with new handlers and co species. All of that is a challenge for the dog and may cause stress, behavioral problems, and fear for novelty (Hennessy et al., 2001; Hiby et al., 2006). Some dogs may spend a big part of their life in shelters. A long time spent at shelters may have notably harmful effects on dogs (Wells et al., 2002; Hewson et al., 2007; Dalla Villa et al., 2013).

Dogs are individuals and they react to the same factors in a different way (Hiby et al., 2006; Titulaer et al., 2013). For example some dogs suffer from separation anxiety which may have a severe impact on the dog's welfare (Papuc et al., 2013). Therefore staying at a shelter, daycare or boarding place may seriously deteriorate

the health of the dog with separation anxiety. At the same time some dogs have well defined neophilia traits and they may have fewer problems to adapt to new conditions (Kaulfuß et al., 2008).

Shelter dogs often have a low quality of life caused by poor environment and unsuitable management (Barnard et al., 2016). There are no harmonised regulations by European authorities regarding the minimum standards of animal welfare for dog daycare or boarding establishments. However, an original protocol based on 12 criteria from Welfare Quality (Blokhuis et al., 2010) described above has been developed and investigated by Barnard *et al.* (2016) to distinguish the main welfare problems for dogs at shelters, which could be adapted to dog daycare or boarding establishments. The protocol is unique to pet animals and designed to be easy to apply by persons with different knowledge. The main idea of the protocol was to create a unique assessment system of the overall welfare of dogs in kennels by supervising the animal's reactions to its environment. Some measurements were standardised in order to determine "gold standard" for future use. The study has resulted in a high level of agreement among the experts (to define the gold standards) on the measures. During the study it was found that shelters have very different facilities due to the lack of standard requirements for shelter management and conditions. Therefore it was difficult to compare animal welfare at such different living environments (Barnard et al., 2016).

Breeding organisations may conduct their own assessment, as well as government authorities - more detail can be found in section *2.3 Dog Welfare in Sweden* regarding such assessment in Sweden.

Assessing the quality of life

According to Stafford *et al,* 2009 there is a strong connection between quality of life and the mental wellbeing of an animal. The term quality of life is analogue to "animal welfare status" with highlighted importance to subjective experience.

Assessing the quality of life of pet animals can be done by monitoring the behaviour of the animal with focus on what it can do (Stafford et al., 2009). Moreover anxiety- and fear-based behavioural problems indicate an unsuitable environment and poor quality of life. Environment that allows an animal to express a range of natural behaviour may indicate good quality of life. The physical conditions have also a great significance in assessing the quality of life. Stafford *et al*. (2009) has noted that little has done to verify quality of life measures in pet animals and he has investigated tools for assessing quality of life of companion animals. The tools

are divided into two groups: research tools and clinical tools. The first group of tools may be used only for the laboratory context that is not relevant for dog day-care/boarding establishments.

The second group that includes clinical tools may be used in veterinary clinics or laboratories by welfare inspectors. This group of tools could be relevant to dog daycare and boarding establishments. According to Stafford *et al.* (2009) the clinical tools should include: identification and quantification of behaviours associated with pain, anxiety or fear and abnormal behaviours; quantifying the time the animal is active and inactive, interaction with conspecifics, opportunities to play, explore, and engage in sport for dogs.; monitoring the management of the animal. This includes quantifying its restrictions, human interaction, nutrition and feeding, sleeping quarters, social circumstances, and 'work'.; determining the requirements specific to its breed, rearing, training and use; identifying and quantifying pleasure behaviours (play, walks, predation); undertaking a physical examination to determine if there are signs of disease, painful conditions or injuries; monitoring the changes in an animal's life as it ages; assessing empathetically what is going on in the animal's life.

2.2.1 Animal-based welfare measures

According to EFSA *et al*. (2012) animal welfare measures are divided into animal- and non-animal based measures. Animal-based measures indicate the animal reaction or a consequence on an animal. The measures may be collected directly on the animal or indirectly. Animal welfare is in direct connection with their ability to exhibit natural behavior (Bracke et al., 2005). The term natural behavior is hard to explain according to De Waal *et al.* (2014) it shows how an animal, guided by nature's rules, can behave in a particular way in a specific environment or in specific circumstances.

Animal welfare is in strong connection with animal's interaction with the environment. Welfare is poor when an animal cannot cope with its environment. Welfare measures include monitoring of coping and outcome to insufficient coping. If an animal has a control over its environment it has good welfare. Poor welfare does not always mean suffering but they often take place at once (Broom et al., 1991).

Broom *et al*, (1991) states that animal welfare can be measured with a wide range of measurements divided into groups such as physiological, behavioral, immunological, fitness and reproductive success measures.

Physiological-assessment

Heart-rate is one of physiological measures which increasing in case of emergency. Heart-rate can be measured and will give information about what is really going on inside. The second physiological measurement of welfare is adrenal cortex activity. The activity is greater in case of emergency (Broom et al, 1991).

Behavioral-assessment

Among behavioral measures reduced activity and unresponsiveness, which act as a response to some events for example as reaction to long time spent in cage, can be taken into account (Broom et al, 1991).

Immunological-assessment

Aside from animal welfare measures there are also poor welfare indicators such as stereotypic and aggressive behavior. Animal welfare can be monitored using immunological measures, injury and disease. Immunosuppression is animal's reaction to difficult conditions. Antibody response may be impaired followed by some factors such as extreme temperature conditions (Broom et al, 1991).

Fitness-assessment

Fitness measures and reproductive success are indicators of animal welfare and they can be measured as well. Thin body and impaired reproductive result are consequences of poor welfare of an animal (Broom et al., 1991).

Animal welfare assessment is developing and changing area of science. Nowadays protocols for animal welfare assessment may include unique measures that have not been used in protocols before. As example of the recent protocol for dog welfare assessment investigated and implemented by Barnard *et al.* (2016) it included to animal based measures, measures such as body condition score, cleanliness of the animals, shivering/panting, skin condition, lameness, evidence of pain, diarrhea, coughing, nasal discharge, dyspnoea, social behavior, abnormal behaviour, barking level, reaction to human, and emotional state profile.

For animal welfare control at the dog daycare and boarding facilities or establishments that keep dogs on non-professional basis adrenal cortex activity which is one of physiological measures could be measured. Behavioral-assessment is also valuable measure for dogs. Immunological- and fitness-assessment have high importance in animal welfare assessment and these are relevant for dogs. Immuno-

logical and fitness measures reflect on animal welfare and show if an animal is suffering or in poor condition.

2.2.2 Resource- and management-based welfare measures

Non-animal based measures assess resources that are available to the animal such as space allocation, housing facilities, and bedding material and management that may have positive or negative impact on the animal welfare (EFSA et al., 2012).

According to EFSA *et al.* (2012) measures based on resources include the assessment of the environment and resources available to the animal such as space allocation, housing facilities, bedding material that may have an impact on the animal welfare. Barnard *et al.* (2016) has included to resource based measures, measures such as water supply, bedding, sharp edges, temperature and humidity, space allowance, and social housing.

Management-based measures indicate how management is done. According to Barnard *et al.* (2016) measures that reflect management procedures include feeding regimen; mortality rate; morbidity rate; surgeries and pain control; and exercise routines.

2.3 Dog welfare in Sweden

Dogs are herd animals and isolation has harmful effect on them (Hetts et al., 1992; Hubrecht et al., 1992; Mertens et al., 1996; Beerda et al., 2000). Therefore it is very important for dogs to be in social contact with people or other dogs most of the day. Contact may be satisfied by activities, exercise and walks (Jordbruksverket 2015). Therefore dogs cannot be left alone for a long time. Day care for dogs is a good way to provide a social contact for pets while owner at work. Despite to large interests to dog care places not everyone can run this kind of business due to the required governmental permissions.

Animal protection controls

There are both official animal welfare controls, and controls conducted by breeding organisations.

Official animal welfare controls are conducted by the county administrative boards that provide animal protection controls on regular basis from the 1st January 2009 (Länsstyrelsen Uppsala län, 2016). The county administrative boards lead controls after complaints, as well provide normal controls based on risk assessment, and

control establishments in case of application to get a license required according to the §16 of the Animal Welfare Act (1988).

Besides the county administrative animal welfare controls the Swedish Kennel Club (SKK) employ experts in veterinary medicine and genetics to provide dog welfare controls based on animal factors with focus to improve dog's health and wellbeing in the future (Malm et al., 2015). Approximately 70% of Sweden's dog population is registered with SKK. Kennel consultants visit kennels on a regular basis. Results from the dog mentality assessment, official competitions and dog shows are registered and saved for future assessment and before breeding SKK 2012). SKK follows the animal protection laws and concerns about health and wellbeing of dogs (SKK 2016).

SKK (2013) recommends to all dog owners provide physical and mental stimulation for their pet; do not live dogs alone for longer than four-five hours. That is not regulated in official animal welfare control. Official animal welfare control requires only walking the dog(s) every sixth hour and have no recommendations about how long dogs may stay alone are given (Jordbruksverket, 2015).

The Swedish animal protection law

According to the Swedish animal protection law a permit from the county administrative board is needed to work with dogs in some cases. Dog boarding place and dog day care are places that require a license. Dog breeders and owners who have many dogs (10 or more dogs older than 12 month of age) although need a permit the Animal Welfare Act (1988).

A permit is required if someone has dog activities that:

1. Breeds three or more litters per year
2. Lease/hire out three or more dogs per year (e.g. sled dogs or guard dogs).
3. Sells dogs from three or more homebred litters per year
4. Sells three or more dogs per year from another breeding
5. Keep four or more dogs (e.g. dog day care and dog boarding place)
6. Has some kind of commercial business in dog area (rental, breeding, selling, and keeping). In original: "Tillstånd krävs för den som yrkesmässigt upplåter hundar." means= tillstånd krävs för de som yrkesmässigt hyr ut hundar.

The person who conducts at least one of the dog activities from the list above is always responsible to obtain the necessary permissions. The person is responsible

for demonstrating that the animal activity complies with current regulations. Anyone who has not applied for a license breaches the Animal Welfare Act (1988) and is prone to be prosecuted and/or notified (Jordbruksverket 2015).

If anyone does not follow the animal welfare regulations, the control authorities, that are the county administrative animal protection inspector or police, impose injunctions and prohibitions. The county administrative boards can make decisions on the disposal of animals and ban to keep and take care of animals. If someone intentionally or negligently violates animal welfare rules can the person be fined or imprisoned for up two years (Jordbruksverket 2015).

3 Methods and implementation

3.1 Data sources

Complete data from official animal welfare control in the whole of Sweden (21 counties) collected from 1 January 2010 to 31 December 2014 was provided by the Swedish Board of Agriculture and analysed in MS Excel and MiniTab to cover objectives and purposes of this thesis.

In 2010 and 2011 a common checklist was used for all pets and companion animals, but only five CPs were specific for dogs. Thus, this data was not analysed here because it was not possible to determine whether the control was related to the welfare of dogs.

The official animal welfare control database includes data from species specific standardised checklists based on animal-, resource-, and management-based measures. Data from the dog welfare checklist were extracted from this database for analysis. The data were collected by skilled inspectors employed by the County Administrative Boards during inspections of premises that keep animals (control sites) according to Regulation (EC) 882/2004.

On the dog welfare checklist, there were 40 species specific CPs related to supervision, environment, health and body condition, exercise requirements, cutting claws, air quality of areas where dogs are kept, etc. Nine CPs were added to the checklist only in 2014 (CP 32-40). Table 1 provides a description of each of the CPs.

Table 1. *Dogs specific control points (CP's) with descriptions taken from the official animal welfare checklist used for all dog's welfare controls*

Control point	**Variable**	**Description**
1	Social contact	The requirements for social contact obtainment or the opportunity to be kept separate for the dogs are met.
2	Claws	Claws are regularly inspected and cut if necessary.
3	Body condition	The dog's body condition is acceptable.
4	Cleanliness/grooming (dog)	The dog/dogs are kept satisfactorily clean and receive the necessary grooming.
5	Walks	Dog walks are implemented on a regular basis at the extent appropriate.
6	Cleanliness/hygiene (facilities)	The facilities, where dogs are kept, are kept satisfactorily clean and cleaning is done with such interval that good hygiene is maintained.
7	Space dimensions	Spaces for the dog/dogs have dimensions in accordance with applicable regulations.
8	Cage ban	The cage ban for dogs is followed by the dog keeper.
9	Tethering	The requirements around the tethering of dogs indoors and outdoors are met.
10	Pinch collar/electric shock	The ban on pinch collar or electric shock usage is respected by dog keeper.
11	Lactating bitches puppies	Lactating bitches and puppies have access to a quiet, undisturbed place. The bitch has access to a place inaccessible to the puppies.
12	Environment	The dog/dogs are kept in an environment and environmental enrichment have adapted to the animal species.
13	Escape safe facilities	Facilities are escape safe. Gaps in the grid, the fence and other devices are designed and adapted to the dogs so that they cannot squeeze out or get stuck.
14	Fire and other emergency	The prerequisites make it possible to rescue dogs from dog stall at the fire.
15	Feed/handling/maintenance	The licensed facility has space for feed and animal handling, bathing and opportunity for maintenance and space for isolation and care of the sick dogs.
16	Climate	The dog/dogs are kept in a climate that is customized to each animal's needs and animal husbandry form. The animals were exposed only occasionally for air pollution. Measured values.
17	Protection from inclement weather	Dogs that kept outdoors have accessibility for theirs customized protection against strong heat, precipitation, humidity, wind and cold.
18	Appropriate shelter during cold season	Only dogs that are suitable for the outdoors climate during the cold season are kept permanently outdoors during the winter.
19	Dog yards design	The requirement according the design of dog yards is met.

20	Warm water supply (in cold season)	When the outdoor temperature is below zero, animals, that are permanently kept outdoors, are supplied with warm water at least 2 times per day.
21	Feed/water intake	The dog/dogs are given the opportunity for a peaceful and natural intake of feed and water.
22	Nutrition	The dog/dogs are given feed that ensure an adequate, complete and balanced nutrition.
23	Water access	The dog/dogs have free access to clean drinking water.
24	Breeding requirements	The requirements concerning breeding are met.
25	Puppies bond with the bitch	The requirement, that the puppies are not separated from the bitch, excepted for temporary need, as long as they need her milk and nursing, is followed.
26	Surgery	Surgery is performed by a veterinarian.
27	Knowledgeable staff	Knowledgeable staff is available during the time the dog was staying there.
28	Opportunity to go away	The dogs can go away from each other.
29	Muzzle	The requirement about the muzzle is met.
30	Education	The person who runs dog daycare or dog boarding place has an education or equivalent experience.
31	Other deficiencies	Is it true that no other deficiencies were found during inspection?
32	Permit § 16	Available or sought a permit under § 16 Animal Welfare Act.
33	Appropriate to conduct the business	Applicant may be deemed appropriate to conduct the business
34	Supervision	Supervision of the dogs is done in sufficient quantities.
35	Necessary care	Sick/injured dogs are given the necessary care if necessary a veterinarian hired.
36	Euthanasia	Euthanasia of dogs is done according to the regulations and without undue suffering to the dog.
37	Artificial lighting	Artificial lighting is so that supervision and care can be done without difficulty
38	Daylight	The requirement for admission of daylight is met.
39	Injury safe environment	Windows, lighting and electrical systems that dogs can reach are protected or are designed so that the risk of injury exists.
40	Noise	Noise in the dog compartment has an acceptable level and frequency. Measured value.

3.2 Data editing and construction of variables

Only four CPs related to the physical state of the animals and their provision of social contact, were animal-based (CP-1to 4). Resource- and management-based CPs included the holding of a permit for professional business, personnel skills, supervision, care, enrichment, facilities, nutrition, veterinary care, and other defi-

ciencies. The inspection results were recorded for each CP as compliant, non-compliant, no control carried out, or not applicable.

The data were analysed specific to each inspection including the year of inspection and the control type. Data specific to each premise included information about its location, the type of animal species kept, the type of activity professional or no-professional (professional are businesses that have a license required according to the §16 of the Animal Welfare Act (1988), non-professional are businesses that do not have a license), and if any other animal-related activities were conducted at the site. The total number of different animal-related activities conducted was calculated.

Classification of professional and non-professional businesses was done to determine daycare and boarding places because these places require a permit. However, because of the quality of data it was not possible to exclude other places that also require a license such as breeding kennels, places that keep more than 10 adult dogs and others from the data.

Inspections had 12 different control types (reasons for inspection). Control types differed by the reasons for the inspection, some controls followed after justified complaints from the general public, another or a veterinarian; some controls were done as a full cross-compliance inspection (TV=tvärkontroll in Swedish); some inspections were conducted for the purpose of an application for professional business permit; and some inspections were conducted at random. The control types were categorised into four groups: 1) normal routine controls, that included normal random and risk-based controls, whereby risk criteria were used determined by the Swedish Board of Agriculture, 2) notification controls, done after report from the general public, a veterinarian or others, 3) monitoring controls, followed up on justified controls, and 4) application controls, which related to an application for a license for a professional business.

Inspection results from the four animal-based CPs concerning social contact CP1, claw condition CP2, body condition CP3, cleanliness and grooming CP4 were used as outcomes of animal welfare and coded as compliance (0) or non-compliance (1) with the CP for analysis.

3.3 Statistical analysis

Descriptive statistics

To understand how characteristics (number of dogs, animal-related activities, number of animal species) differed between professional facilities and non-professional premises, a descriptive analysis of the dog premises characteristics was first conducted, stratifying by professional status, and type of control. An Anderson Darling Normality test was conducted on the continuous variables (number of dogs, number of species, and number of activities). Mean and standard deviation as well as median and interquartile range are presented for the continuous variables.

Summary reports for inspections at premises that keep dogs are presented in the Appendix.

Occurrence of dog welfare problems

An analysis of the outcomes of all official animal welfare inspections of dog premises was conducted to determine the most frequent dog welfare problems in Sweden. The percent of non-compliant inspections was calculated as:

$$\frac{\text{number of non-compliant inspections}}{\text{number of compliant + non-compliant inspections}} \times 100$$

Professional versus non-professional

To assess the differences between professional and non-professional dog premises, descriptive characteristics were compared. Due to the fact that the continuous variables were not normally distributed the non-parametric Mann-Whitney (Wilcoxon) test to identify statistical differences between two groups was used.

Number and percentage (%) of inspections non-compliant with animal-based control points, stratified by professional vs non-professional, for all controls and also for normal routine controls only, are presented. Not applicable or not controlled animal-based measures were treated as missing and were excluded from the analysis. A Chi-square test was used to assess statistical differences in proportion of non-compliant CPs between the two groups (professional versus non-professional establishments).

The Fisher's exact p-value was reported, because of the small numbers in some cells (<10 observations), due to the fact that it is more conservative.

Control types

There were twelve different control types, and these were categorised into four different control type categories for ease of analysis and to assess differences of the reasons for 9245 inspections.

Number and percentage (%) of inspections non-compliant with animal-based CPs, stratified by the categorised type of control are reported. Not applicable or not controlled animal-based measures were treated as missing and were excluded from the analysis.

Welfare status

To determine if welfare status of dog daycare and boarding establishment can be determined using the official animal welfare control database the dog activities were classified into four groups such as daycare, boarding place, kennel and hobby activities.

The activities names were picked up from the information conducted by animal welfare inspectors. The information was not standardised and I classified it by slecting common words as "hunddagis" (dog daycare in Swedish), "hundpensionat" (dog boarding in Swedish), "kenell", and "hobby".

Year

To assess whether there was an increasing or decreasing trend over the three year study period, the percentage of inspections non-compliant with the requirements for all control points, for normal (routine) inspections only, were calculated. Univariable binary logistic regression was used to assess whether the trends in non-compliance across study years were statistically significant. The model was adjusted for clustering on premises, by including the premises identification number as a random term, because some premises had multiple inspections during the study period. Odds ratios (OR) and their 95% confidence intervals (CI) are presented. ORs greater than one (>1) present increasing trend, ORs less than one (<1) present decreasing trend.

P-values at less than 5% were considered significant for all tests.

4 Results

4.1 Site and inspection characteristics

There were a total of 17,660 premises registered with the Swedish Board of Agriculture that had dogs during the study period. Under paragraph 16 in the Animal Welfare Act (1988)., 11% of establishments were registered as being a professional business. Descriptive characteristics, stratified by professional and non-professional business, are presented in Table 2. There were 954 premises with number of dogs recorded at professional premises and 9611 premises with number of dogs at non-professional premises; 2019 total professional premises with animal species registered and 15,641 non-professional. Totally, 7095 premises had an unknown number of dogs (Table 2).

Differences between non-professional and professional registered premises were statistically significant. Namely, it was found that the number of dogs in professional businesses was significantly higher than in non-professional ($p<0,001$). There was evidence that professional businesses conducted more activities ($p=0,006$), but kept significantly fewer other animal species (i. e. - most kept only dogs), than non-professional premises ($p<0,001$).

Table 2. *Descriptive characteristics for professional versus non-professional*

	Professional	***Non-professional***	***p-value[3]***
Number of dogs			
N	954	9611	***<0,001***
Mean (±s.d.)[1]	14,76 (13,16)	2,27 (2,93)	
Median (IQR)[2]	11,00 (20-6)	1,00 (2-1)	
Total activities			
N	2019	15641	***0,006***
Mean (±s.d.)	1,31 (0,67)	1,26 (0,61)	
Median (IQR)	1,00 (1-1)	1,00 (1-1)	
Total animal species			
N	2019	15641	***<0,001***
Mean (±s.d.)	1,32 (0,85)	1,65 (1,18)	
Median (IQR)	1,00 (1-1)	1,00 (2-1)	

1 s.d = standard deviation
2 IQR = interquartile range
3 p-values based on Mann-Whitney (Wilcoxon) test

The total number of inspections from 2012 to 2014 was 9245.This total includes inspection types detailed in Table 3. For all inspections, there was a mean of 4,61 dogs per site (±s.d. 7,19; median 2,00 , IQR 4), 1,61 species per site (±s.d. 1,21, median 1,00, IQR 1), and 1,23 animal-related activities per site (±s.d. 0,61; median 1,00, IQR = 0).

Summary reports stratified by professional and non-professional establishments that include detailed information on the number of dogs, number of total activities, and number of total species at inspected premises are presented in the Appendix.

There were totally twelve different reasons for an inspection to be conducted (control type). These include random (n=49 inspections), risk based (n= 260), directed (n= 291), public (n= 2697), another (n= 379), veterinarian (n= 43), unjustified (n= 2774), previous notification (n= 1461), previous normal (n= 246), permit (n= 1035), cross-compliance (n=9), and other public (n=1).

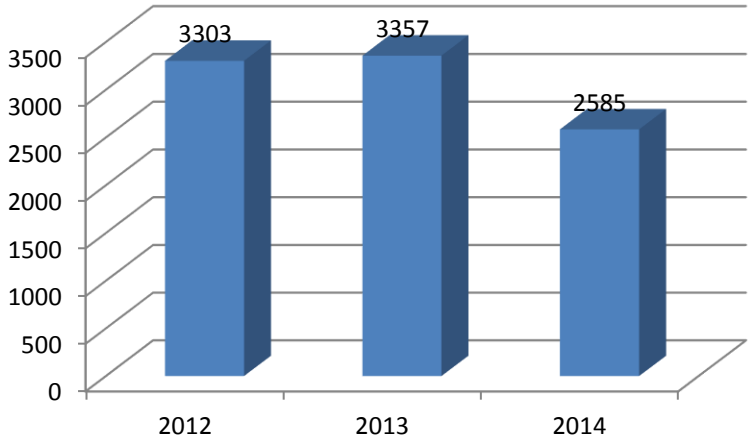
Table 3. *Descriptors of the dog premises characteristics, stratified by type of control, based on official animal welfare inspections of dogs premises conducted in Sweden, 2012-2014*

	Normal control			**Complaint**				**Follow-up**		**Application**	
	Directed	**Risk**	**Random**	**Public**	**Another**	**Veterinarian**	**Unjustified**	**Previous notification**	**Previous normal**	**Permit[1]**	**Cross-compliance**
Inspections (n)	291	260	49	2697	379	43	2774	1461	246	1035	9
Dogs per site											
mean (±sd)	6,01 (7,59)	5,29 (8,24)	3,27 (2,66)	3,48 (5,46)	3,74 (4,86)	3,89 (5,12)	2,52 (3,75)	4,46 (5,93)	11,18 (12,76)	13,89 (12,10)	2,00 (1,15)
median (IQR)	3,50 (4)	2,00 (4)	2,00 (4)	2,00 (2)	2,00 (3)	2,00 (2)	1,00 (1)	2,00 (4)	5,00 (12,5)	10,00 (12)	2,00 (2)
Species per site											
mean (±sd)	1,67 (1,23)	2,17 (1,64)	2,12 (1,32)	1,65 (1,24)	1,63 (1,16)	1,49 (0,96)	1,38 (0,85)	1,92 (1,46)	2,34 (1,82)	1,33 (0,97)	4,44 (3,50)
median (IQR)	1,00 (1)	2,00 (2)	2,00 (2)	1,00 (1)	1,00 (1)	1,00 (1)	1,00 (1)	1,00 (1)	2,00 (2)	1,00 (0)	3,00 (4,5)
Activities per site											
mean (±sd)	1,38 (076)	1,56 (0,85)	1,69 (0,82)	1,21 (0,57)	1,20 (0,56)	1,19 (0,50)	1,09 (0,39)	1,32 (0,68)	1,70 (0,95)	1,27 (0,72)	1,89 (1,05)
median (IQR)	1,00 (1)	1,00 (1)	2,00 (1)	1,00 (0)	1,00 (0)	1,00 (0)	1,00 (0)	1,00 (0)	1,00 (1)	1,00 (0)	2,00 (1,5)

1 New, or compliance with an operating permit under §16 of the Animal Welfare Act (1988).
2 Other public (n=1) inspection type that has not been detailed here.
For continuous variables, the meand, standard deviation, and median and interquartile range (IQR) are presented.

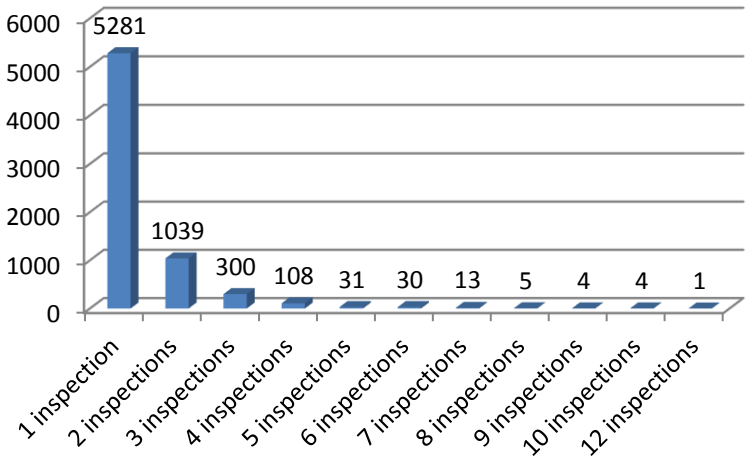
Totally 9245 inspections were conducted during the study period, 3303 premises were inspected in 2012, 3357 in 2013, and 2585 inspections in 2014 (see Figure 1).

Figure 1. Number of premises inspected on the dog welfare checklist by year in Sweden



It was found that totally 6816 premises were inspected over the three years studied; 5281 premises were inspected just once but others were inspected up to 12 times (see Figure 2).

*Figure 2.*Number of *premises inspected on the dog welfare checklist in Sweden, 2012 to 2014*



Here I present the analysis stratified by the four grouped control categories: normal, complaint, follow-up, and application. Table 4 shows how inspections were divided among professional and non-professional establishments (according to §16 of the Animal Welfare Act (1988)) by the four control categories. In general there were fewer inspections conducted at professional establishments compared with non-professional, except for application inspections.

Table 4. Number and percentage (%) of inspections stratified by type of control and by professional versus non-professional establishments (according to §16 of the Animal Welfare Act (1988)), based on official animal welfare inspections of dog premises in Sweden, 2012-2014

Control type	Non-professional	Professional	Total
Normal	490 (82%)	110 (18%)	600
Compliant	5656 (96%)	237 (4%)	5893
Follow-up	1533 (90%)	174 (10%)	1707
Application	193 (19%)	852 (81%)	1045
Total	7872 (85%)	1373 (15%)	9245

4.2 The prevalence of poor welfare in dogs

Table 5 presents only animal-based control points, by control type category. In general it was found that CPs showed lower percent of non-compliance with the requirements based on official animal welfare inspections at application inspections compared with controls that were normal, follow-up on deficiencies or conducted because of a complaint. There were totally 317 cases of non-compliance with animal based control points for CP1that is 3,4% of all inspections for social contact; 1341 cases of CP2 that is 1,4% of all inspections for claws; 1251 cases for CP3 that is 13,5% of all inspections for body condition; 569 cases of CP4 that is 6,1% of all inspections for cleanliness/grooming.

Table 5. Number and percentage (%) of inspections non-compliant with animal-based control points, stratified by type of control, based on official animal welfare inspections of dog premises in Sweden, 2012-2014

Control point	Type of control			
	normal	complaint	follow-up	application
Social contact (CP-1)	17 (3,30%)[1]	200 (4,13%)	76 (6,22%)	24 (2,41%)
Claws (CP-2)	58 (15,34%)	978 (20,32%)	290 (26,15%)	15 (2,06%)
Body condition (CP-3)	57 (12,10%)	893 (16,34%)	279 (20,17%)	22 (2,97%)
Cleanliness/grooming (CP-4)	21 (4,56%)	426 (7,86%)	118 (8,80%)	4 (0,49%)

1 Calculated as: number of non-compliant inspections/(number of compliant + non-compliant inspections) x 100.

4.3 Dogs welfare differences at professional versus non-professional establishments

To demonstrate differences between the professional and non-professional establishments I assessed the four animal-based CPs for normal controls only, and observed some significant differences between the two (see Table 6). Claw condition and body condition were significantly worse at non-professional establishments (claws, p=0,049; body condition, p=0,008). Providing social contact was significantly better for non-professional establishments (p=0,002). There were no significant differences between professional and non-professional establishments for compliance with requirements for body cleanliness and grooming (p = 0,563).

Table 6. *Number and percentage (%) of inspections non-compliant with animal-based control points, stratified by professional vs non-professional, for normal controls only, based on official animal welfare inspections of dog premises in Sweden, 2012-2014*

Control point	Variable	Professional	Non-professional	p-value [a]
1	Social contact			
	Compliant	94 (91%)	404 (98%)	***0,002***
	Non-compliant	9 (9%)	8 (2%)	
2	Claws			
	Compliant	55 (93%)	265 (83%)	***0,049***
	Non-compliant	4 (7%)	54 (17%)	
3	Body condition			
	Compliant	77 (96%)	337 (86%)	***0,008***
	Non-compliant	3 (4%)	54 (14%)	
4	Cleanliness/grooming			
	Compliant	80 (94%)	359 (96%)	0,563
	Non-compliant	5 (6%)	16 (4%)	

a Chi-square test for difference between groups, the Fischer's exact p-value.

Table 7 presents non-compliance with resource- and management based control points at professional and non-professional establishments, for normal (routine) controls only. It may be concluded that only five of the resource and management-based control points were significantly different between professional and non-professional establishments. Non-compliance with space dimensions (p<0,001) and other deficiencies (p=0,018) were significantly more likely at professional establishments. Non-compliance with space dimensions means that spaces for the dog/dogs have dimensions in no accordance with applicable regulations. Non-compliance with other deficiencies means that other deficiencies were found during inspection that, were not picked up by any of the other CPs.

Non-compliance with requirements for tethering (p=0,036), nutrition (p=0,050) and knowledgeable staff (p=0,031) were significantly more likely at non-professional premises. Where non-compliance with the requirements for tethering means that the requirements around the tethering of dogs indoors and/or outdoors are not met; non-compliance with requirements for nutrition means that the dog/dogs are given feed that do not ensure an adequate, complete and balanced nutrition; and non-compliance with requirements for knowledgeable staff means that knowledgeable staff is not available during the time the dog was staying at the inspected place.

Although borderline significant, professional establishments were more like to not comply with requirements for environmental conditions (p=0,054). Where non-compliance with environment means that the dog/dogs are kept in an inappropriate environment and/or environmental enrichment have not adapted to the animal species.

Table 7 *Number and percentage (%) of inspections non-compliant with resource- and management-based control points, stratified by professional vs non-professional, for normal controls only, based on official animal welfare inspections of dog premises in Sweden, 2012-2014*

Control point	Variable	Professional	Non-professional	p-value [a]
5	Walks			
	Compliant	86 (94%)	337 (91%)	0,300
	Non-compliant	5 (6%)	35 (9%)	
6	Cleanliness/hygiene (facilities)			
	Compliant	80 (84%)	285 (87%)	0,614
	Non-compliant	15 (16%)	44 (13%)	
7	Space dimensions			
	Compliant	61 (63%)	299 (89%)	***<0,001***
	Non-compliant	36 (37%)	39 (11%)	
8	Cage ban			
	Compliant	88 (89%)	322 (93%)	0,196
	Non-compliant	11 (11%)	23 (7%)	
9	Tethering			
	Compliant	67 (98%)	225 (91%)	***0,036***
	Non-compliant	1 (2%)	22 (9%)	
10	Pinch collar/electric shock			
	Compliant	58 (100%)	203 (99%)	1,000
	Non-compliant	0 (0%)	1 (1%)	

11	Lactating bitches puppies			
	Compliant	23 (92%)	73 (94%)	0,676
	Non-compliant	2 (8%)	5 (6%)	
12	Environment			
	Compliant	62 (74%)	248 (84%)	0,054
	Non-compliant	22 (26%)	48 (16%)	
13	Escape safe facilities			
	Compliant	75 (89%)	212 (95%)	0,126
	Non-compliant	9 (11%)	12 (5%)	
14	Fire and other emergency			
	Compliant	47 (89%)	47 (98%)	0,115
	Non-compliant	6 (11%)	1 (2%)	
15	Handling/maintenance			
	Compliant	57 (86%)	4 (80%)	0,543
	Non-compliant	9 (14%)	1 (20%)	
16	Climate			
	Compliant	91 (95%)	361 (97%)	0,340
	Non-compliant	5 (5%)	11 (3%)	
17	Protection from inclement weather			
	Compliant	31 (69%)	83 (76%)	0,419
	Non-compliant	14 (31%)	26 (24%)	
18	Appropriate shelter during cold season			
	Compliant	13 (76%)	50 (93%)	0,087
	Non-compliant	4 (24%)	4 (7%)	
19	Dog yards design			
	Compliant	34 (49%)	85 (59%)	0,185
	Non-compliant	35 (51%)	58 (41%)	
20	Warm water supply (in cold season) (in cold season)			
	Compliant	11 (100%)	15 (94%)	1,000
	Non-compliant	0 (0%)	1 (6%)	
21	Feed/water intake			
	Compliant	61 (98%)	211 (98%)	1,000
	Non-compliant	1 (2%)	4 (2%)	
22	Nutrition			
	Compliant	57 (100%)	242 (93%)	***0,050***
	Non-compliant	0 (0%)	17 (7%)	
23	Water access			
	Compliant	84 (91%)	331 (93%)	0,490
	Non-compliant	8 (9%)	23 (7%)	
24	Breeding requirements			

	Compliant	34 (97%)	120 (99%)	0,400
	Non-compliant	1 (3%)	1 (1%)	
25	Puppies bond with the bitch			
	Compliant	16 (100%)	36 (92%)	0,548
	Non-compliant	0 (0%)	3 (8%)	
26	Surgery			
	Compliant	38 (100%)	104 (100%)	-
	Non-compliant	0 (0%)	0 (0%)	
27	Knowledgeable staff			
	Compliant	46 (98%)	4 (67%)	***0,031***
	Non-compliant	1 (2%)	2 (33%)	
28	Opportunity to go away			
	Compliant	46 (94%)	8 (89%)	0,501
	Non-compliant	3 (6%)	1 (11%)	
29	Muzzle			
	Compliant	39 (97%)	8 (100%)	1,000
	Non-compliant	1 (3%)	0 (0%)	
30	Education			
	Compliant	44 (98%)	4 (80%)	0,192
	Non-compliant	1 (2%)	1 (20%)	
31	Other deficiencies			
	Compliant	97 (88%)	464 (95%)	***0,018***
	Non-compliant	13 (12%)	26 (5%)	
32	Permit § 16			
	Compliant	35 (83%)	1 (12,5%)	***<0,001***
	Non-compliant	7 (17%)	7 (87,5%)	
33	Appropriate to conduct the business			
	Compliant	35 (97%)	5 (55,5%)	***0,004***
	Non-compliant	1 (3%)	4 (44,5%)	
34	Supervision			
	Compliant	39 (95%)	96 (91%)	0,511
	Non-compliant	2 (5%)	10 (9%)	
35	Necessary care			
	Compliant	25 (100%)	44 (76%)	***0,008***
	Non-compliant	0 (0%)	14 (24%)	
36	Euthanasia			
	Compliant	14 (100%)	14 (100%)	-
	Non-compliant	0 (0%)	0 (0%)	
37	Artificial lighting			
	Compliant	36 (100%)	78 (100%)	-
	Non-compliant	0 (0%)	0 (0%)	

38	Daylight			
	Compliant	33 (94%)	78 (99%)	0,223
	Non-compliant	2 (6%)	1 (1%)	
39	Injury safe environment			
	Compliant	23 (74%)	50 (91%)	***0,058***
	Non-compliant	8 (26%)	5 (9%)	
40	Noise			
	Compliant	23 (100%)	65 (100%)	-
	Non-compliant	0 (0%)	0 (0%)	

a Chi-square test for difference between groups, the Fischer's exact p-value:- =no p-value obtainable; significant differences are ***bold and italicised***.

4.4 The most frequent dog welfare problems

At all inspections, it may be concluded that the highest percentage non-compliance with animal based measures was 19% for claws, followed by 15% for body condition, then 7% for cleanliness/grooming and 4% for social contact.

The most frequent non-compliant resource or management –based CP was design requirements for dog yards compared with others control points according to official animal welfare inspections of dog premises in Sweden (Table 8).This was followed by non-compliance with requirements for protection from inclement weather (e.g. strong heat, precipitation, humidity, wind and cold) while outdoors, and by non-compliance with requirements for necessary care.

Also shown to have greater than 10% non-compliance were requirements for the regularity and length of walks, the facility cleanliness, space dimensions, environment and species-specific enrichment; injury safe environment, appropriate to conduct the business, and access to clean drinking water. The rest of the resource or management-based welfare problems have not shown high importance.

Table 8. *Outcome of all official animal welfare inspections of dog premises in Sweden, 2012-2014*

		Control outcome, number of inspections				
Control point	**Variable**	Not applicable	No control	Compliant	Non-compliant	**% non-compliant inspections[a]**
1	Social contact	310	1362	7256	317	4%
2	Claws	242	1976	5686	1341	19%
3	Body condition	210	974	6810	1251	15%
4	Cleanliness/grooming (dog)	170	1039	7467	569	7%
5	Walks	93	2115	5978	1059	15%
6	Cleanliness/hygiene (facilities)	181	1559	6221	1284	17%
7	Space dimensions	750	2257	5329	909	15%
8	Cage ban	335	2744	5647	519	8%
9	Tethering	737	2857	5222	429	6%
10	Pinch collar/electric shock	479	4012	4740	14	0,3%
11	Lactating bitches puppies	6403	1730	1018	94	8%
12	Environment	436	2215	5463	1131	17%
13	Escape safe facilities	2869	2364	3775	237	6%
14	Fire and other emergency	5111	2395	1628	111	6%
15	Handling/maintenance	6352	1684	1120	89	7%
16	Climate	792	2204	5841	408	6%
17	Protection from inclement weather	5851	1247	1516	631	29%
18	Appropriate shelter during cold season	6647	1516	996	86	8%
19	Dog yards design	5710	1170	1296	1069	45%
20	Warm water supply (in cold season)	6805	1992	431	17	4%
21	Feed/water intake	124	3644	5300	177	3%
22	Nutrition	165	3107	5391	582	10%
23	Water access	209	2341	5959	736	11%
24	Breeding requirements	5639	2552	950	104	10%
25	Puppies bond with the bitch	6268	1992	934	51	5%
26	Surgery	1646	5191	2400	8	0,3%
27	Knowledgeable staff	7468	1099	642	36	5%
28	Opportunity to go away	7352	1129	725	39	5%
29	Muzzle	7221	1349	671	4	0,6%
30	Education	7488	1099	613	45	7%
31	Other deficiencies	0	0	8552	693	7%

32	Permit § 16	1729	266	483	111	19%
33	Appropriate to conduct the business	1618	447	468	56	11%
34	Supervision	56	460	1865	208	10%
35	Necessary care	421	920	922	326	26%
36	Euthanasia	708	1446	433	2	0,5%
37	Artificial lighting	234	675	1658	22	1%
38	Daylight	221	507	1800	61	3%
39	Injury safe environment	451	944	1039	155	13%
40	Noise	461	910	1214	4	0,3%

a Calculated as: number of non-compliant inspections/(number of compliant + non-compliant inspections) x 100.

4.5 Can welfare status of dog daycare/boarding be determined using the animal welfare control database?

To determine if welfare status of dog daycare and boarding establishments can be determined using the official animal welfare control database the professional dog activities were classified into three groups: daycare, boarding kennel, and breeding kennel. I was able to classify only 98 premises from 173 inspections: 44 inspections at 31 dog daycare centres, 43 inspections at 25 boarding kennels, and 115 inspections at 60 breeding kennels. Some were classified as conducting more than one dog-related activity, and the majority of the classified dog daycare, boarding kennels and breeding kennels were not also registered under paragraph 16 of the Animal Welfare Act for conducting a commercial activity. Because of this, the data is presented, but is not considered reliable, and thus no inferences on dog welfare at these establishments should be made.

We found many different groups that termed the same activity such as the dog daycare activity had many names in the field, for example: “hunddagis”, “Hunddagis”, “ja, hunddagis”, “Hunddagis.”, “Hundpensionat, hunddagis, kattpensionat”, “Färdigställd lokal för hunddagisverksamhet.”, ”Hunddagisverksamhet”.

Boarding kennels were represented by the following terms: “Kennel”, “Nybyggnation av hundpenisonat samt kennelverksamhet”, “Kennel verksamhet”, and” Uppfödning av hundar samt pensionat i mindre omfattning.”.Breeding kennels were named as: “Hållande och uppfödning av hundar av raserna chihuahua och bostonterrier.”, ”Uppfödning av hundar av rasen russkaya tsvetnaya bolonka.”, ”Hunduppfödning”, ”§ 16 hunduppfödning”, and ”Hobby & uppfödning”.

There were dog activities classified as missing due to the fact that we could not classified them into any group because we were not sure about what activities were conducted there. Here are examples of activities that we were not sure about: “16 § hund”, “Hund - tillståndspliktig verksamhet”, ”Hundverksamhet”, ”hundhållning, 16 §”, ” hundhållning”.

Table 9. *Number and percentage (%) of inspections non-compliant with animal-based control points, stratified by type of dog related activity,, based on official animal welfare inspections of dog premises in Sweden, 2012-2014*

Control point	Variable	Dog Daycare	Boarding Kennel	Breeding Kennel
1	Social contact			
	Compliant	27 (93%)	26 (93%)	70 (93%)
	Non-compliant	2 (7%)	2 (7%)	5 (7%)
2	Claws			
	Compliant	21 (80%)	23 (85%)	50 (88%)
	Non-compliant	4 (20%)	4 (15%)	7 (12%)
3	Body condition			
	Compliant	33 (92%)	27 (75%)	74 (88%)
	Non-compliant	3 (8%)	9 (25%)	10 (12%)
4	Cleanliness/grooming			
	Compliant	28 (97%)	29 (94%)	76 (96%)
	Non-compliant	1 (3%)	2 (6%)	3 (4%)

a Chi-square test for difference between groups, the Fischer’s exact p-value..

4.6 Missing data on dog welfare from the animal welfare control database

During the study it was found that some data on dog welfare from the official animal welfare control database was missing (Table 10). From the 1373 inspections conducted over the study period at professional establishments, 74% (1016/1373) were missing specific details on the dog-related activities conducted, and 39% missing the number of dogs kept (539/1373). From the 7872 inspections conducted over the study period at non-professional premises, 89% (6972/7872) were missing specific details on the dog-related activities conducted, and 25% missing the number of dogs kept (1998/7872).

Table 10. *Missing data from 2012-2014 (n=9245 inspections)*

Variable	Professional	Non-professional	Total number missing
Specific dog-related activities conducted	1016 (74%)	6972 (89%)	7988 (86%)
Number of dogs	539 (39%)	1998 (25%)	2537 (27%)

The data that was not controlled and/or not applicable may also be classified as missing see the CPs with a high percentage of non-control at inspection (Table 8).

4.7 Does the welfare of dogs improve over the study period in Sweden?

To answer the question if the welfare of dogs improves over the study period in Sweden, results of inspections compliant and non-compliant for all CPs, for normal (routine) controls only were analysed by year (see Table 11). Only four CPs have shown a significant difference across the years and one CP has shown a borderline significant trend in difference across the years. CP-32 to 40 were not included in this analysis as they were only introduced in 2014.

Non-compliance with requirements for tethering (p=0,021), knowledgeable staff (p=0,027), and other deficiencies (P=0,012) significantly decreased over the study period.

Non-compliance with muzzle prescriptions has shown significant results, but there was no clear increase or decrease, with 0% of non-compliance in 2012, 8% in 2013 and 0% in 2014.

Table 11. Number and percentage (%) of inspections compliant and non-compliant for all control points, for normal inspections only, based on official animal welfare inspections of dog premises in Sweden, 2012-2014.

Control point	Variable	2012	2013	2014	OR (95% CI)	p-value[1]
1	Social contact					
	Compliant	119 (98%)	247 (96%)	132 (96%)	1,20 (0,62- 2,32)	0,586
	Non-compliant	3 (2%)	9 (3%)	5 (4%)		
2	Claws					
	Compliant	95 (86%)	129 (87%)	96 (81%)	1,25 (0,86- 1,81)	0,235
	Non-compliant	15 (14%)	20 (13%)	23 (19%)		

3	Body condition					
	Compliant	119 (88%)	173 (90%)	122 (85%)	1,15 (0,75- 1,76)	0,532
	Non-compliant	16 (12%)	20 (10%)	21 (15%)		
4	Cleanliness/grooming					
	Compliant	118 (93%)	188 (97%)	133 (95%)	0,80 (0,43- 1,48)	0,477
	Non-compliant	9 (7%)	5 (3%)	7 (5%)		
5	Walks					
	Compliant	96 (86%)	217 (94%)	110 (92%)	0,70 (0,40- 1,21)	0,199
	Non-compliant	16 (14%)	14 (6%)	10 (8%)		
6	Cleanliness/hygiene (facilities)					
	Compliant	97 (83%)	158 (88%)	110 (86%)	0,90 (0,61- 1,30)	0,531
	Non-compliant	20 (17%)	21 (12%)	18 (14%)		
7	Spaces dimensions					
	Compliant	86 (88%)	183 (83%)	91 (78%)	1,43 (1- 2,10)	***0,059***
	Non-compliant	12 (12%)	37 (17%)	26 (22%)		
8	Cage ban					
	Compliant	90 (92%)	211 (92%)	109 (93%)	0,91 (0,60- 1,44)	0,687
	Non-compliant	8 (8%)	18 (8%)	8 (7%)		
9	Tethering					
	Compliant	86 (89%)	108 (92%)	98 (97%)	0,52 (0,30- 0,91)	***0,021***
	Non-compliant	11 (11%)	9 (8%)	3 (3%)		
10	Pinch collar/electric shock					
	Compliant	84 (99%)	96 (100%)	81 (100%)	-	-
	Non-compliant	1 (1%)	0 (0%)	0 (0%)		
11	Lactating bitches puppies					
	Compliant	7 (70%)	75 (97%)	14 (87%)	0,41 (0,03- 5,33)	0,500
	Non-compliant	3 (30%)	2 (3%)	2 (13%)		
12	Environment					
	Compliant	86 (83%)	127 (83%)	97 (78%)	1,20 (0,85- 1,70)	0,299
	Non-compliant	17 (17%)	26 (17%)	27 (22%)		
13	Escape safe facilities					
	Compliant	54 (93%)	154 (93%)	79 (93%)	1,02 (0,52- 2,0)	0,958
	Non-compliant	4 (7%)	11 (7%)	6 (7%)		
14	Fire and other emergency					
	Compliant	30 (97%)	36 (95%)	28 (87%)	2,18 (0,71- 6,72)	0,174
	Non-compliant	1 (3%)	2 (5%)	4 (13%)		
15	Handling/maintenance					
	Compliant	11 (73%)	17 (85%)	33 (92%)	0,50 (0,22- 1,14)	0,098

	Non-compliant	4 (27%)	3 (15%)	3 (8%)		
16	Climate					
	Compliant	106 (97%)	230 (98%)	116 (94%)	1,83 (0,78- 4,31)	0,163
	Non-compliant	3 (3%)	5 (2%)	8 (6%)		
17	Protection from in-clement weather					
	Compliant	31 (76%)	41 (73%)	42 (74%)	1,05 (0,67- 1,64)	0,843
	Non-compliant	10 (24%)	15 (27%)	15 (26%)		
18	Suitability for cold season					
	Compliant	15 (79%)	25 (100%)	23 (85%)	0,82 (0,27- 2,53)	0,730
	Non-compliant	4 (21%)	0 (0%)	4 (15%)		
19	Dog yards design					
	Compliant	27 (60%)	61 (60%)	31 (47%)	1,34 (0,90- 2,00)	0,152
	Non-compliant	18 (40%)	40 (40%)	35 (53%)		
20	Warm water supply (in cold season)					
	Compliant	6 (86%)	9 (100%)	11 (100%)	-	-
	Non-compliant	1 (14%)	0 (0%)	0 (0%)		
21	Feed/water intake					
	Compliant	77 (99%)	102 (98%)	93 (98%)	1,26 (0,41- 3,84)	0,684
	Non-compliant	1 (1%)	2 (2%)	2 (2%)		
22	Nutrition					
	Compliant	94 (95%)	111 (97%)	94 (91%)	1,46 (0,69- 3,10)	0,320
	Non-compliant	5 (5%)	3 (3%)	9 (9%)		
23	Water access					
	Compliant	94 (92%)	217 (96%)	104 (89%)	1,33 (0,72- 2,50)	0,368
	Non-compliant	8 (8%)	10 (4%)	13 (11%)		
24	Breeding requirements					
	Compliant	7 (88%)	131 (100%)	16 (94%)	0,70 (0,00- 6862,8)	0,935
	Non-compliant	1 (12%)	0 (0%)	1 (6%)		
25	Puppies bond with the bitch					
	Compliant	9 (75%)	29 (100%)	14 (100%)	-	-
	Non-compliant	3 (25%)	0 (0%)	0 (0%)		
26	Surgery					
	Compliant	39 (100%)	63 (100%)	40 (100%)	-	-
	Non-compliant	0 (0%)	0 (0%)	0 (0%)		
27	Knowledgeable staff					
	Compliant	11 (100%)	14 (82%)	25 (100%)	0,64 (0,44- 0,95)	***0,027***

	Non-compliant	0 (0%)	3 (18%)	0 (0%)		
28	Opportunity to go away					
	Compliant	14 (100%)	15 (83%)	25 (96%)	1,07 (0,50- 2,30)	0,852
	Non-compliant	0 (0%)	3 (17%)	1 (4%)		
29	Muzzle					
	Compliant	10 (100%)	11 (92%)	26 (100%)	0,61 (0,42- 0,90)	***0,013***
	Non-compliant	0 (0%)	1 (8%)	0 (0%)		
30	Education					
	Compliant	9 (100%)	15 (94%)	24 (96%)	1,43 (0,31- 6,53)	0,647
	Non-compliant	0 (0%)	1 (6%)	1 (4%)		
31	Other deficiencies					
	Compliant	131 (86%)	273 (97%)	157 (95%)	0,50 (0,30- 0,85)	***0,012***
	Non-compliant	22 (14%)	8 (3%)	9 (5%)		

1 Binary logistic regression

5 Discussion and conclusion

5.1 Main findings

5.1.1 Site and inspection characteristics

Non-professional establishments had more activities registered compared to professional ones. This could mean that establishments that do not have a permit to keep dogs for commercial purpose, according to the requirements in the §16 in the animal welfare act the Animal Welfare Act (1988), do not have dogs as a main animal species and may have other animal species as well as conducting other animal-related activities. For example dairy farmers keep cows and conduct other activities that support the cow's husbandry (among them feed cultivation, harvesting and production) and milking but at the same time they may also have a dog as a companion animal. Furthermore farms that have multiple activities related to egg production, horse keeping, meat production and others are very popular. Professional establishments may have only dog's activities in their focus due to the fact that the dogs are the main source of their business. This is also supported by the finding that establishments registered as professional also have fewer other animal species. For example dog daycare and boarding establishments in most cases only take care of dogs.

There were fewer premises with dogs inspected in 2014 with the number of premises inspected by year also decreasing significantly from 2013 to 2014. For unknown reasons, there may have been less need for inspections in 2014. We can speculate there were some other reasons such as fewer premises to inspect or the lack of educated animal controllers that we are not familiar with.

Some premises were inspected more often than others. Most subsequent inspections were following-up from previous deficiencies. This may mean that premises

inspected more often had more welfare problems that needed to be fixed. Though, we do not have information on inspections on the dog checklist before 2012.

The most common reason for inspection was because of a complaint by the general public, veterinarian or other. However, inspections due to an unjustified complaint made up more than half of these inspections.

It may be concluded that people, especially the general public are increasingly worried about the welfare of animals and they also wish to improve it. The positive finding here is that many of the complaints were unjustified, meaning that the welfare problems assessed by the inspector may not as been as bad as conferred by the person making the compliant. There is a trend that people are more concerned about animal welfare and as a consequence they are more likely to report problems (Lagerkvist et al., 2006; Veissier et al., 2008; Mayfield et al., 2007).

Inspections at non-professional establishments were more frequent compared with professional establishments. Additionally non-professional dog keepers had a higher proportion of inspections due to normal inspections or inspections due to a complaint, or follow-up to a previously identified welfare problem. However, professional establishments had more controls because of an application for a permit to conduct commercial activities due to the fact that many professional establishments that work with dogs require a permit and they need to apply for one to conduct their activity. We found that professional establishments do not always have better welfare. Perhaps it is because professional establishments hold a permit, so they are more likely to be inspected under the criteria for applications.

5.1.2 The prevalence of poor welfare in dogs

The four animal-based CPs were used to indicate whether there was poor dog welfare. The highest percentage of non-compliance with the animal-based CPs was found at inspections due to a follow-up of previously identified welfare problems, with claw condition being the most frequent problem, followed by body condition, cleanliness of the dogs, and lastly social contact. Non-compliance with animal-based CPs at complaint inspections was also high.

The welfare of dogs was better at inspections because of an application for getting started with a professional establishment. It may be suggested that the owner or management of an establishment is not likely to invite inspectors to inspect premises if they have poor welfare.

The best indication of the welfare situation in Sweden however, is the findings for normal controls, as these are the least biased, and thus may be more comparable to results from other studies. Non-compliance with the animal-based CPs ranged from 3-15% at these normal (routine) inspections. There are studies that say that dogs are more prone to overweight than to lose weight nowadays (Kushner et al., 2006; German et al., 2006). The Swedish study (Sallander (a) et al., 2010) has resulted that no dogs from total 460 Swedish dogs in 1999 consumed diets under the nutritional recommendations. Dogs in Sweden have great odds for obesity (Sallander (b) et al., 2010). However rescue dogs, sick and dogs in stress conditions may have poor body condition (Klevar et al., 2015; Bedrak et al., 1965; Michel et al., 2008). Our findings only present whether the premises were non-compliant therefore we do not know if the dogs were overweight or in poor body condition. As well as this, we do not know how many dogs had problems with putting on weight or weight loss. But there are studies on obesity in dogs that have found obesity rates to be between 10-40% (Bland et al., 2009), so the high rate of non-compliance might be a reflection of this.

There is a lack of studies that shows that non-compliance with social contact is common dog welfare issue. But there are studies that say that the lack of social contact may be improved by visual conspecific contact, human interaction and environmental enrichment (Wells et al., 1998; Coppola et al., 2006; Hubreth et al., 1993).

There is a lack of studies on dog claw condition and cleanliness of the dogs so non-compliance with claw condition is a new finding not yet reported (to my knowledge).

5.1.3 Dogs welfare difference at professional versus non-professional establishments

Professional establishments had significantly better welfare compared to non-professional establishments. Non-compliance with requirements for adequate claw condition and body condition was significantly higher at non-professional establishments. It may be explained by lack of knowledge concerning that the claws should be cut regularly, by people who takes care of dogs at non-professional premises. The worse body condition may be also explained by the lack of knowledge or by the lack of resource such as enough money for well balanced feed (Bland et al., 2009). Companion dog owners feed their pets with leftovers from the dinner table, which are not healthy and well balanced nutrition for dogs at

all. Therefore some dogs may be overweight or vice versa underweight (Colliard et al., 2006; Sanderson et al., 2007; Czirjak et al., 2008; Bland et al., 2009).

Providing social contact was significantly better for non-professional establishments. It can be explained that dogs at non-professional establishments are not for making money, they are more companions that get social contact through more time spent with people or other dogs. It may also be the result of the high amount of dogs at the professional establishment. If one premises has a large number of dogs they maybe do not get enough attention from the personnel and not all dogs might get social contact from other dogs (Hubrecht et al., 1993). Some dogs stay alone in single kennels because of the risk of transmission of disease and injury, or maybe some bitches are in heat, or if dogs are different ages or are of different size (Wells et al., 1998). Some professional establishments do not have an opportunity to keep dogs in large groups or in the same kennel due to the lack of space.

The study finds that non-professional establishments had significantly higher percentage of non-compliance for the control points for tethering, nutrition, and knowledgeable staff. It supports our suggestion above that lack of knowledge and poor dog nutrition among non-professional establishments may contribute to poor welfare. It was also shown that the resource and management-based control points for space dimensions and other deficiencies had significantly higher percentage of non-compliance at professional establishments. That supports our suggestion above that some establishments have space dimensions that do not follow the requirements. It may be explained by a large number of animals per square meter due to the fact that more dogs bring more money for the business.

In addition to the possible reasons discussed above, the differences in non-compliance between professional and non-professional establishments might also be in part because there are significant differences in the characteristics (number of dogs, animal-related activities, number of animal species) of those premises. Further, due to the large number of statistical tests conducted, there is an increased risk of finding falsely significant differences for some of the CPs. Because I have only identified those CPs that are significant in univariable analysis, the next step would be to include those significant results in a multivariable model, as well as to include the factors related to the premises characteristics and inspection conducted (e.g. control type). The multivariable analysis would help us to then identify those CPs of most importance and to understand the relationships between all these variables.

5.1.4 The most frequent dog welfare problems

The study has shown that non-compliance with design requirements for dog yards was the most frequent dog welfare problem compared with others CPs according to official animal welfare inspections of dog premises in Sweden. It may be explained by the lack of resources for building new facilities following all standards or rebuilding if the premise is located in the old building. It supports our previous finding concerning the lack of knowledge. Maybe people who built the facilities did not have knowledge about what is required.

The second frequent problem is non-compliance with protection from inclement weather.. Frequency of this problem may be also explained by the lack of knowledge.

5.1.5 If welfare status of dog daycare/boarding can be determined using the animal welfare control database?

It was difficult to determine if welfare status of dog daycare or boarding establishments could be determined using the animal welfare control database because of the difficulty to obtain what kind of dog-related activities were collected under the field “Activities”. Information in the field was not divided into standardised groups. We had only one field with the data where we could only observe the activities named in very different ways. Classification into three groups was done by our association with the terms. Therefore there is a risk that the results we obtained differ from the results that inspectors conducted because of the way we understood their classification.

The results are probably not reliable because of the large variety of terms used in the field activity. A large part of the data was classified as missing due to some cases answered with just “yes” or “no” but no descriptions were attached, so therefore it was impossible to use some of answers at all because we do not know what exactly they mean.

Ideally, data from the field "Activities" could be separated into standardised categories that can be selected when the inspector is inputing data into the database. For example, there could be selections for daycare, boarding kennels, breeding kennels, and training facilities. It might be possible to more reliably determine the welfare status of dog daycare or boarding establishments if collected information were classified into well standardised groups.

However, on a small sample size, my preliminary analysis has found that there were more inspections at breeding kennels. Non-compliance with requirements for adequate claw condition was higher at dog daycare establishments, and for body condition non-compliance was higher at boarding kennels. But because of the small sample size and data were not considered reliable there is no conclusions maybe done only that data collection should be standardised and harmonised.

5.1.6 Missing data on dog welfare from the animal welfare control database

During the study period it was found that some data on dog welfare from the official animal welfare control database was missing. It may be concluded that the results in the study are not accurate because of the missing data. We may just speculate concerning the reason why so large part of data was missing. Maybe it happened because of the lack of knowledge of controllers who collected the data, maybe the way the data was collected was not successful, or maybe the problem was in used aids for data collection, or maybe the owners of the controlled premises did not provided all relevant information to controllers. The main conclusion regarding missing data is that this situation should be improved and missing data must be reduced to a minimum.

A large part of the data that was not controlled and/or not applicable was also classified as missing CPs with a high percentage of non-control at inspection.

The CP that whether there were any other deficiencies (CP-31) had a high percentage of non-compliance. This CP may hold important information about the welfare of dogs at these establishments, but this information is in free text format and thus difficult to analyse. The data collection should be improved in way to decrease missing data so much as possible.

5.1.7 If the welfare of dogs improves over the study period in Sweden?

Only four CPs showed significant differences across the study years and one CP (CP-7) has showed a borderline significant trend for increasing in non-compliance across the study years. Non-compliance with requirements for tethering (CP-9) decreased by about 50% each year over the study period. This suggests improvement in welfare on that CP.

According to the Swedish Board of Agriculture dog tethering or chaining is prohibited indoors and dog tethering outdoors is only aloud to a maximum of two hours per day and only in such a way that does not pose a risk for injury to the dog (Jordbruksverket et al., 2010). During the study period dog tethering was only a problem among unprofessional establishments, with only one occurrence at a professional establishment.

There were significant changes in the percentage of non-compliant establishments for knowledgeable staff (CP-27), though numbers of non-compliant inspections were low. At normal inspections there were knowledgeable staff or/and owners.

Requirements for muzzle prescriptions (CP-29), significantly decreased, with zero occurrence of non-compliance in the final year of the study. Neither of these welfare issues were high frequency. There is a lack of studies on dog muzzle and there are no findings on if muzzle may cause welfare issue to the dog, yet reported (to my knowledge).

These results should be interpreted with some caution, however, because a univariable analysis was used to assess if the results were statistically significant. Thus there is a risk of falsely significant trends for some CPs. In the future, I would consider all information including year and premises characteristics in a multivariable model.

5.2 Problems in the study

In the study I have been faced with the problem of extracting information on dog boarding kennels and daycare, and other professional businesses in paragraph 16 of the Animal Welfare Act. I have been in contact with the Swedish Board of Agriculture County Administrative Boards from all 21 counties and they could not give clear information regarding which premises were registered as daycare and boarding kennels. Therefore I could not provide my study just only on dog daycare and boarding places. Instead I have been analysed the data in whole paragraph 16 which include other professional activities as well, such as breeding kennels, sled dog tourism, and events.

The data collection should be improved so it is possible to extract information only about daycare and boarding establishments, and other dog-related activities. Nowadays it is a complicated and takes many work hours because it needs to be done manually.

There are few scientific studies about animal-based measures specific for dogs at daycare and boarding establishments. Despite this fact, there are many similarities with dog kennel and shelter environments the dog daycare and boarding may still have significant differences. For example daycare care for dogs usually only during an eight-hour day five days a week, but boarding care for dogs longer time and

dogs sleep there as well. Dogs at daycare are familiar with the environment, each other, and the personnel while dogs in boarding maybe faced with the absolutely novel environment.

It was difficult to attribute the dog's welfare status for all animal-based welfare measures to the establishments that conduct daycare and boarding activities. Having arrival cards that include this information may be used by daycare establishments to contact authorities if there is a welfare issue. The professional establishments may have the responsibility to report a welfare problem even though that might mean losing money. The animal-based welfare measures are more suitable for animals in long term boarding or for dogs that visit daycare regularly. CPs that assess the establishments ability and competence to care for such animals might be the most practical to employ.

Many non-professional premises are not visited as a routine control, if they are not in the risk group, but maybe they should be visited. It might happen that some places conduct activities that require a permit but they do not have any and they do not plan to apply to get one.

5.3 Recommend improvements for animal welfare assessment

5.3.1 General

Because of the complexity of animal welfare assessment, EFSA *et al.(*2012) recommends to improve and standardise the animal-based measures and the methods used to record them. Monitoring protocols should be improved by including factors that may have positive and negative effects on animal welfare. These, EFSA recommendations would be beneficial for improvement of animal welfare assessment specific for dogs in Sweden.

The EFSA *et al*. (2012) opinions are based on an animal welfare concept that includes physical and mental conditions of the animal. According to EFSA "five freedoms" is a definition for ideal states for animal welfare. At the same time "five freedoms" do not give any standards for acceptable welfare. EFSA notes that the term "animal welfare" describes the state of an individual animal and it can be used for assessing welfare of animal groups. There is no any common standard for data collection based on animal welfare measures. Since 2004, EFSA has produced different scientific opinions on the use of animal-based measures to assess the welfare of farm animals but not such research conducted for dogs.

In general the EFSA *et al.* (2012) scientific opinion and Welfare Quality (Blokhuis et al., 2010) have similar concepts on animal-based measures for animal welfare assessment. The main difference between them is that the Welfare Quality includes more signs of good welfare. The EFSA scientific opinion and Welfare Quality still need to be harmonized and improved.

According to EFSA *et al*. (2012) the principles used in Welfare Quality (Blokhuis et al., 2010) are specialised to farm animals but not relevant for welfare assessment in other species or habitats, but Blokhuis *et al.* (2010) states that all criteria have the same importance for an animal.

Animal welfare checklist specific for dogs should include more animal-based CPs because these measures indicate the welfare of the animal (EFSA et al., 2012). Welfare Quality 12 criteria (Blokhuis et al., 2010) may be used for improvement of official animal welfare checklist and data collection should be standardised.

5.3.2 Dog daycare and boarding establishments

Checklists should be more adapted /specialised for daycare and boarding kennels. A gold standard for animal welfare control does not exist and it means that it is difficult to check dog establishments equally well. Therefore it may be useful to create one common gold standard for dog welfare control specific for dog daycare and boarding kennels. So it might improve control results and as a consequence it might have a positive impact on the dog's welfare at professional establishments.

Nowadays there are only four CPs related to dog daycare and boarding establishments. Suggested CPs that might be beneficial for official animal control specific for dog daycare and boarding establishments and maybe included in the dog checklist CPs, as also suggested by Barnard *et al. (*2016):

- assess lameness with dogs,
- monitor diarrhea and vomiting cases,
- assess dog coughing frequency,
- assess the mortality rate and its causation,
- monitor abnormal behavior,
- assess reaction to humans.

Other CPs implemented by RSPCA *et al.* (2009):

- confirm that the dogs have all needed vaccination and identification number.

Finally, additional CPs that I think would also be useful to include in the dog welfare checklist:

- requires health insurance for the dogs so that it is easier to take sick animals to a veterinarian,
- monitor and save the history of the dog health during the staying in the professional establishment so it makes easy to keep track of the possible dog diseases,
- how many hours dogs might be left unsupervised in the facilities during the night time,
- how many dogs per caretaker should be involved in the professional establishments,
- dogs are getting rest after feeding and before and after walks.

CP-30 that controls for the education requirements are fulfilled must be improved. The education requirement is very good criteria for someone that might open or own a dog business such as daycare and boarding kennel. The education requirement includes the need to understand dog behavior, first aid, stress behavior and some knowledge about problem owners. However the suitability of each individual course is not controlled nowadays and there are many places to get this education in Sweden. Therefore education level of management for professional establishments should be recorded. Nowadays the suitable education is required only for people who manage and/or own the dog daycare or boarding establishments. So it is allowed that owner or manager has a required education but others employers do not need to be educated. It might be that sometimes those places are supervised by people without required knowledge or education. It should be improved by recording the education requirement for everyone who is taking care of dogs at such establishments.

CP-3 that assess if the dog body condition is acceptable should be improved due to possible poor feed management that dogs get at their regular homes (Bland et al., 2009). If daycare or boarding place is taking care of dog who is an poor condition resulted by bad handling at home, the establishment may be complained by the public, even if the establishment was not responsible for the dog's welfare before it stayed. So the situation might be improved by the dog body condition and health being recorded on arrival to the dog daycare and boarding establishments.

Overall, it may be concluded that there are few welfare problems at premises with dogs in Sweden, and that there is a trend for improved welfare for some resource- and management-based measures. There is however a lack of measures that are specific to assessing the welfare of animals at dog daycare and boarding estab-

lishments. It is recommended that more animal-based CPs be added to the dog checklist, that data collection be standardised and harmonized, and that more normal (routine) controls be conducted both at professional and non-professional establishments. Continuation of monitoring of trends in non-compliance with CPs will help us to target those welfare problems that might be a problem in the future, and to monitor the effects of any intervention strategies that are implemented with the aim of reducing dog welfare problems in Sweden.

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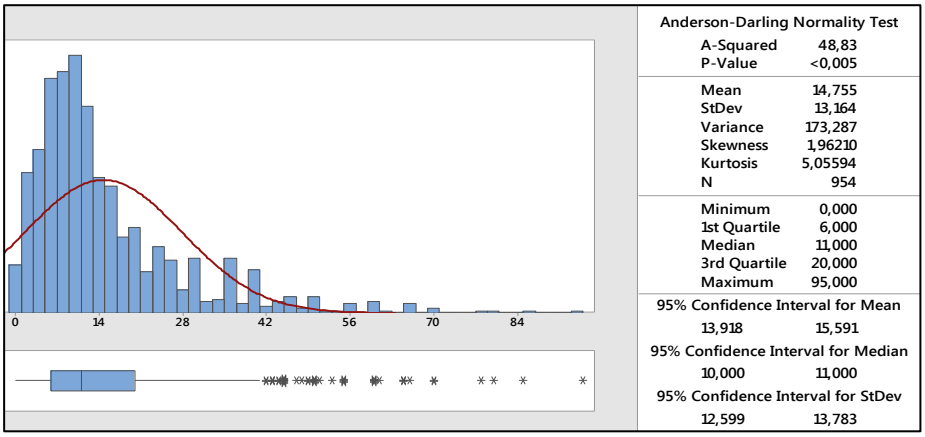
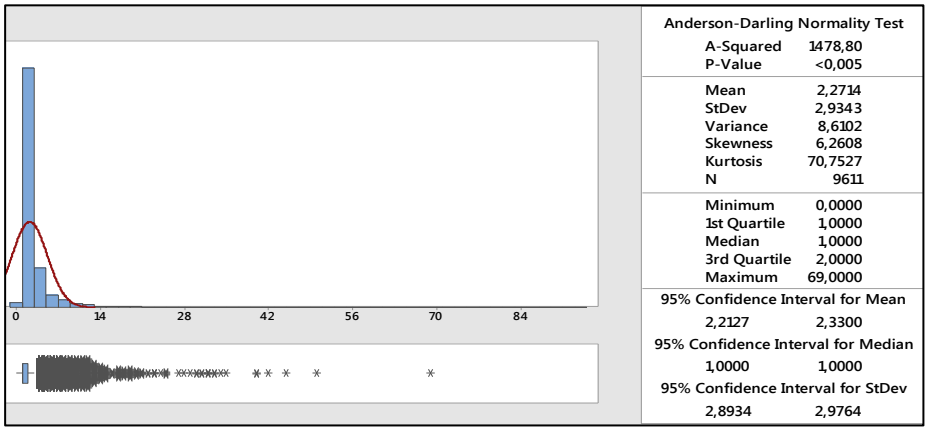
6 Appendix

Appendix Figure 1. Descriptive statistics for the number of dogs based on official animal welfare inspections of dogs premises conducted in Sweden, 2012-2014

(a) Professional establishments, according to paragraph 16 of the Animal Welfare Act (1988)

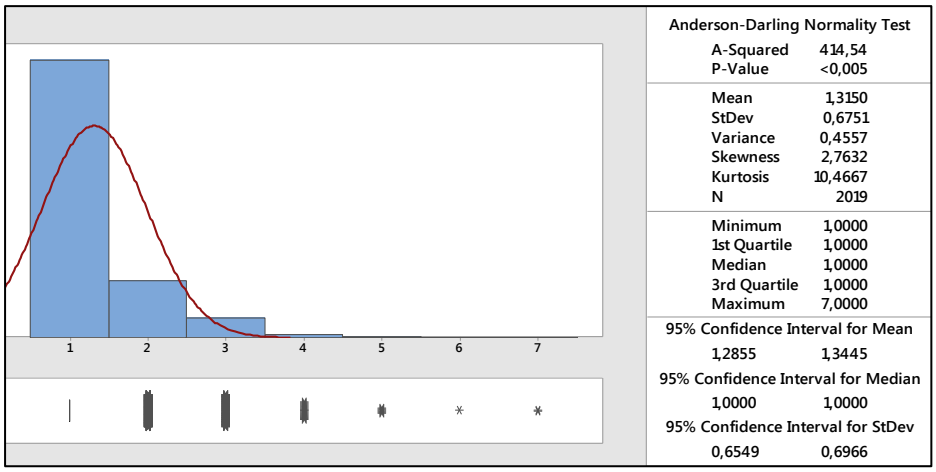


(b) Non-professional establishments

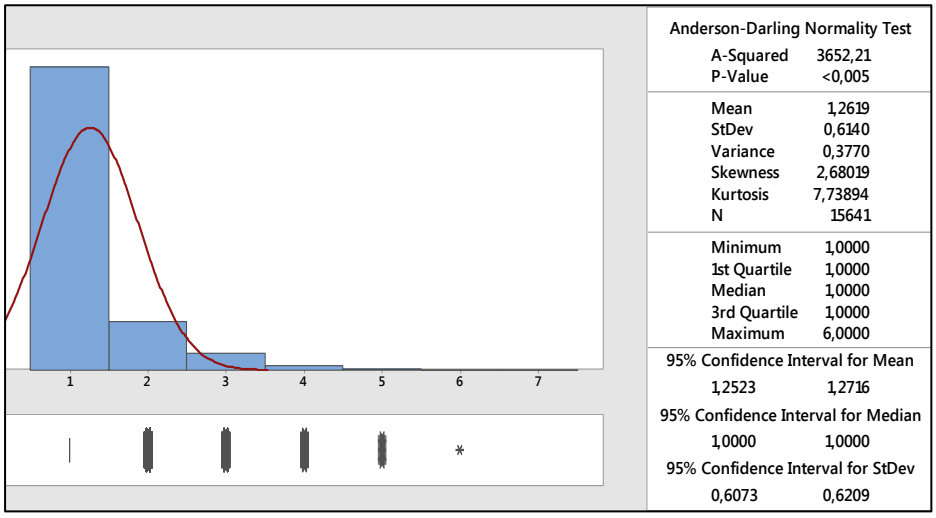


Appendix Figure 2. Descriptive statistics for the number of animal-related activities conducted, based on official animal welfare inspections of dogs premises conducted in Sweden, 2012-2014

(a) Professional establishments, according to paragraph 16 of the Animal Welfare Act (1988)

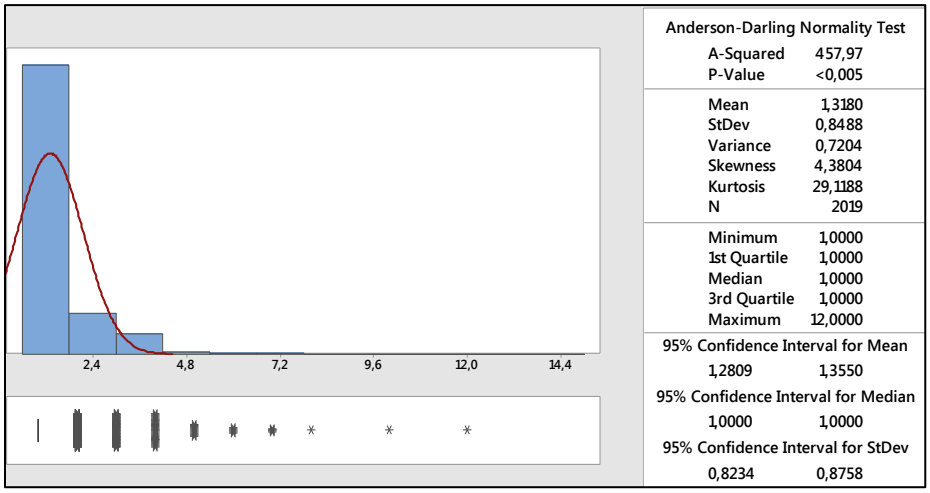


(b) Non-professional establishments



Appendix Figure 3. Descriptive statistics for the number of animal species registered at the premises, based on official animal welfare inspections of dogs premises conducted in Sweden, 2012-2014

(a) Professional establishments, according to paragraph 16 of the Animal Welfare Act (1988)



(b) Non-professional establishments