

Summary Report of the Anatolian Shepherd Dog Health Survey

**Data collected by ASDCA in partnership with OFA from
December 1, 2009 to September 5, 2011**

**Report Authors:
Jessica Voss, DVM, MRCVS, ASDCA Health Coordinator
Robert Owen, Ph.D.**

May 31, 2012

General Data:

A total of 397 surveys were completed, of the respondents 171 (43.1%) represented male Anatolian Shepherd Dogs, and 222 (55.9%) represented female Anatolian Shepherd Dogs. There were significantly more (p value < 0.05) female than male respondents to the survey. All subsequent P-value calculations that address significant results based on gender have been adjusted to reflect this finding.

The most common source of the respondents' Anatolian Shepherd Dog was directly from a breeder (57.7%), the second most common source was breeding the animal oneself (31.5%). Obtaining the Anatolian Shepherd Dog from breed rescue or a shelter was the third most likely source when the numbers for those two responses were combined (5.8%). Other sources and online breeders were the least represented sources. Five survey participants did not identify the source of their Anatolian Shepherd Dog (See Figure 1.) It is worthy to note that these categories may be slightly ambiguous, as many breeders advertise online, and some breeders place returned stock with persons that might otherwise seek an Anatolian Shepherd Dog from breed rescue or a shelter. It is unclear if participants would categorize rehomed animals obtained from a breeder differently from animals purchased from a breeder.

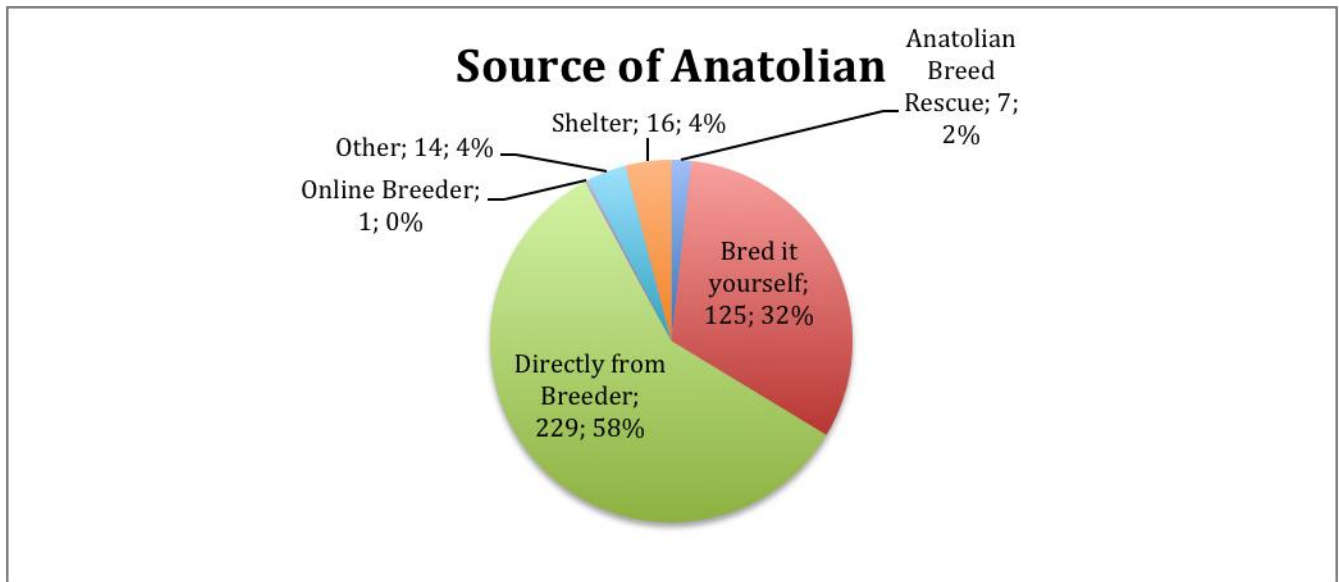


Figure 1: Chart representing source of Anatolian Shepherd Dog in both absolute number of respondents and percentage of respondents.

Survey participants were asked to identify the use of their Anatolian Shepherd Dog into 6 categories. (See Figure 2.) Participants were allowed to classify their canine into as many categories as necessary, and there was no means of identifying primary versus secondary uses of the canine. The most common uses, in descending order, were family companion or guardian, livestock guardian, and breed conformation shows.

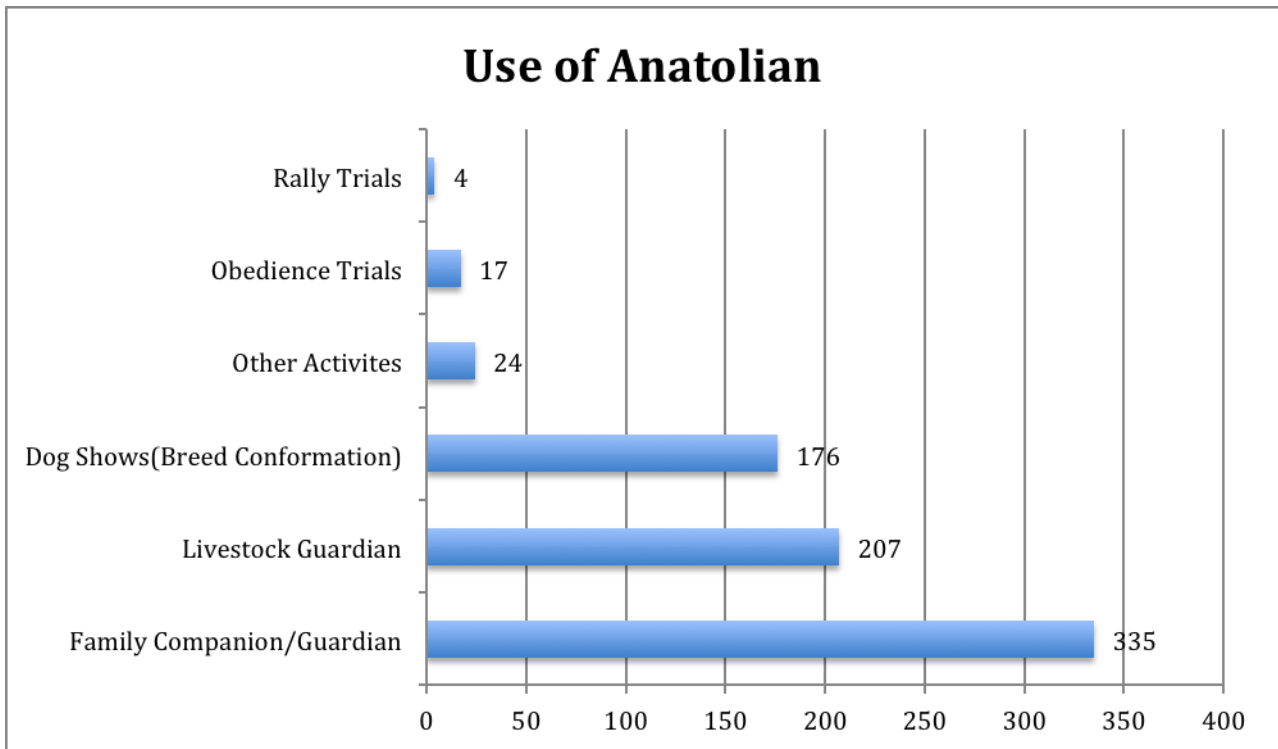


Figure 2: Use of Anatolian histogram representing the number of animals classified into each use. As animals could be entered in more than one category, the total is greater than the total number of participants (397).

Of the 288 (72.5%) dogs living at the time of the survey, 139 (48.3% of total living) were male, and 149 (51.7% of total living) were female. Four survey participants chose not to identify the sex of their canine. Of the 105 (26.4%) dogs deceased at the time of the survey, 31(29.5% of total deceased) were male, and 73 (69.5% of total deceased) were female. One survey participant chose not to identify if the canine was living or deceased, and as before, four of those that identified if their canine was living or deceased did not identify the sex of the canine. (See Figure 3.) These data relating to the deceased male and female dogs showed significantly more deceased female than male dogs, even once corrected for the overall greater number of survey results received regarding female Anatolian Shepherds. It is unclear if the deceased female animals would cause sampling bias, but it is conceivable that if morbidity data were higher in this group, that sampling bias would exist.

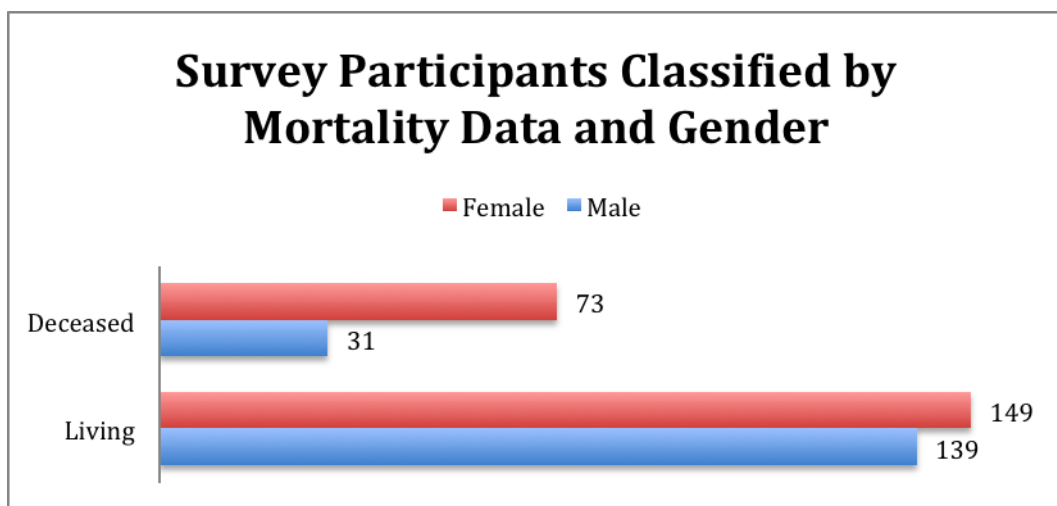


Figure 3: Histogram showing the distribution of survey participants by gender and mortality data at the time of the survey.

Within our survey participants, 105 represented intact male dogs, 65 represented neutered male dogs, 127 represented intact female dogs, and 93 represented neutered female dogs. For either male or female dogs, there were significantly more intact than neutered. However, there was no statistical difference in the probability of an Anatolian being neutered based on its gender.

Table 1. Distribution of gender and neuter status for survey participants.

Gender	Neuter Status		Total
	Intact	Neutered	
Male	105	65	170
Female	127	93	220
Total	232	158	390

Mortality data:

A total of 105 deaths were reported, representing 26.4% of the respondents. Of these 73 (69.5%) were female and 31 (30.5%) were male. (Figure 3.) As exact age of death was not reported, specific mean, median, and standard deviation values regarding age at death could not be calculated. Likewise cause of death was not correlated with reported deaths, so the most common causes of death could not be determined. Of the 105 mortalities reported, 93% did not have a necropsy performed and 62.9% were euthanized. Of the 62.9% euthanized, no indication was given as to reason for euthanasia.

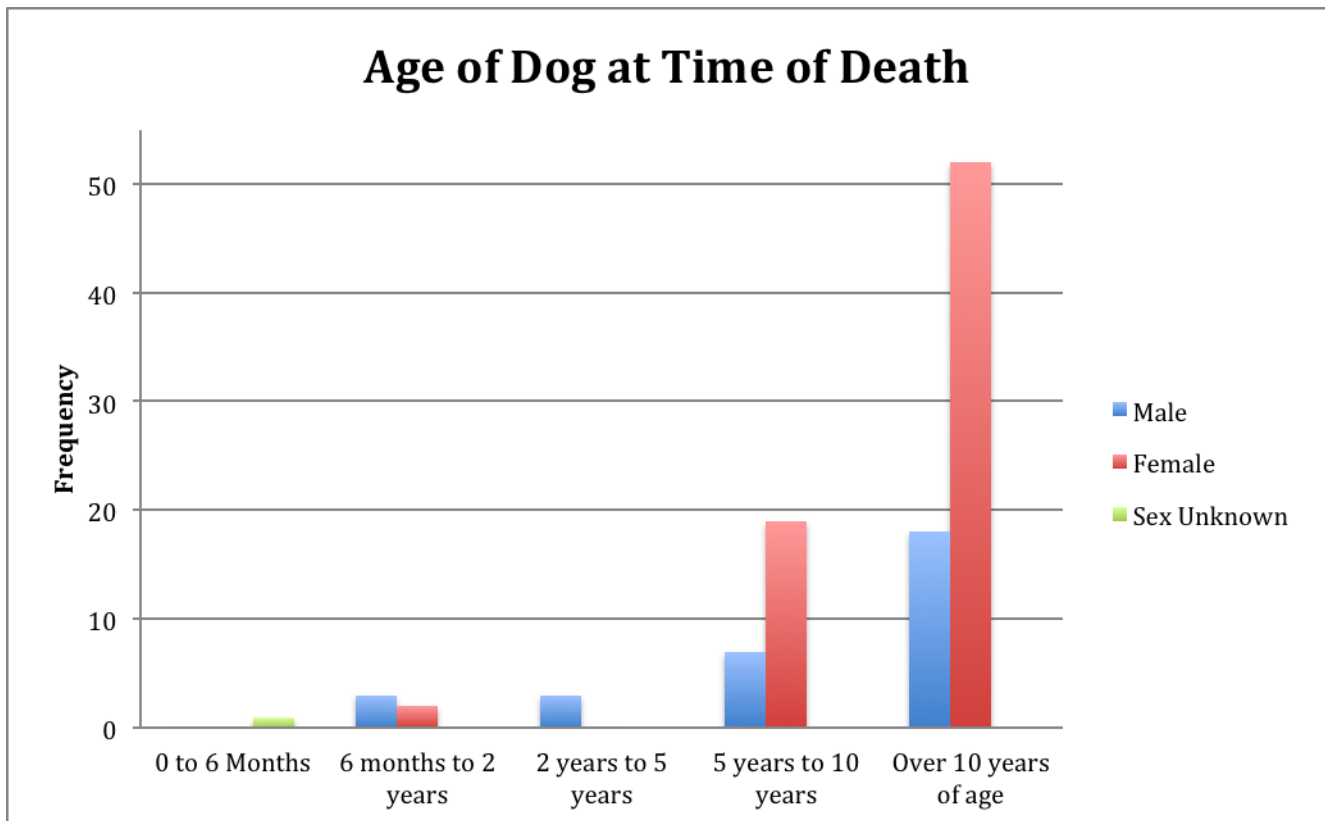


Figure 4. Histogram showing frequency (as number of dogs) of age of death (in years) for the 105 dogs with age of death reported.

There were significantly more (p value < 0.05) female than male over 10 year age categories. This would appear to indicate that significantly more female dogs survive to this older age category.

Morbidity Data:

Owner perception of canine health was assessed using two separate questions. One question requested that owners classify their dog's health into one of five categories: bad, poor, fair, good, or excellent. The health rating excellent was given to 70% of all dogs regardless of sex, 75% of females, and 65% of males. The health rating of fair, poor or bad was given to 6.7% of all dogs regardless of sex, 7.7% of females and 5.9% of males (Figure 5). Ten survey participants abstained from classifying their dogs' health. The other question requested that the owner indicate if the dog had had any significant health problems with an affirmative or negative answer. 17.7% of all dogs regardless of sex, 19.2% of males, and 16.2% of females indicated that the dog had had significant health problems. 82.2% of all dogs regardless of sex, 80.8% of males, and 83.7% of females indicated that the dog had not had significant health problems. Thirteen survey participants abstained from answering the question. The combined percentages of bad, poor and fair classifications did not match the percentages of affirmative answers from the second question. This indicates that either some participants classified their dog's health as good, while also indicating that the dog had had significant health problems. An alternative explanation is that different participants abstained for answering each question.

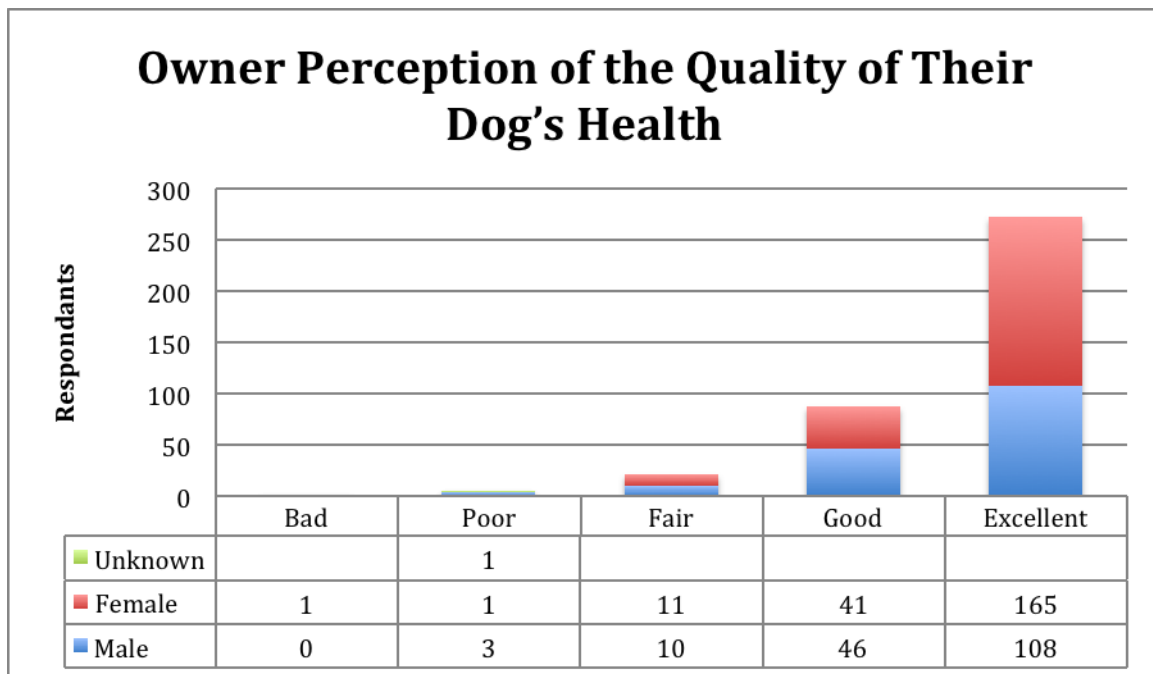


Figure 5. Histogram and table of classification of owner perception of the quality of their dog's health using five descriptive terms. Each classification was significantly different from all others.

Examining the question of onset of significant health issues, participants were asked to indicate in which age range their dog exhibited the problems (Figure 6). As exact age of onset of significant health problems was not reported, specific mean, median, and standard deviation values regarding age at onset of significant problems could not be calculated.

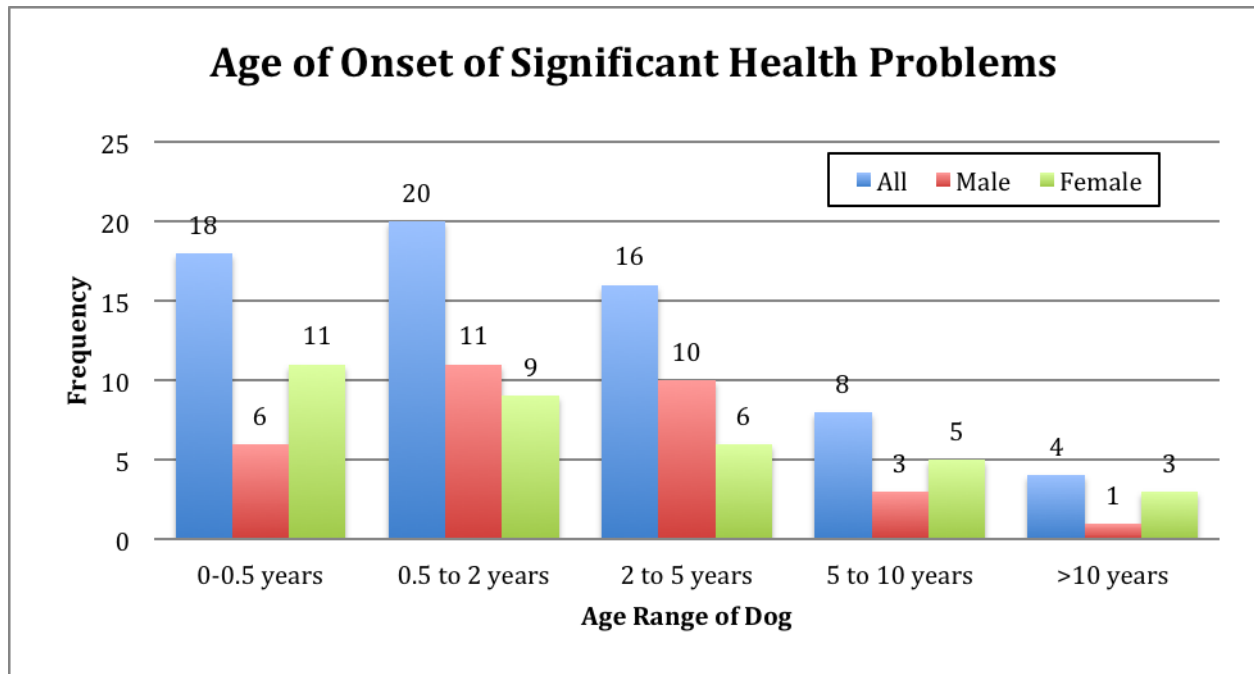


Figure 6. Histogram showing frequency (as number of dogs) of the age of onset (in years) of significant health problems in the 66 dogs for which age of onset was reported. These data are reported for all dogs (blue) and for male (red) or female (green) dogs. There was no significant difference between genders in any age range.

Health problems reported to affect 10% or greater of the survey respondents were ear, orthopedic, skin, and allergies. Health problems reported in 2% or less of survey respondents were cardiovascular, kidney, endocrine, respiratory, blood/lymph and liver disorders (Figure 7). Analysis of the differences in health problems between males and females suggest that there were some differences between the sexes, however given the limited sample sizes, it is difficult to make an general comments related to these differences. Furthermore, given the small sample size, no attempt was made to further analyze the distribution with organ/system categories. The sole exception to this was with the temperament description by age question, as the sample size was large enough for analysis.

The most commonly reported health problem was ear disorders, with 14.7% of all respondents indicating that their Anatolian Shepherd Dog was affected (Figure 7). Of the respondents that indicated their dog was affected, 55% identified the type of disorder as chronic otitis and 38.3% identified the type of disorder as otitis externa (Figure 8).

The next most commonly reported health problem was orthopedic disorders with 12.7% of all respondents choosing to answer this question indicating that their Anatolian Shepherd Dog was affected by orthopedic disorders. Of the respondents that indicated their dog was affected 25.8% identified the type of disorder as hip dysplasia, and 25.8% identified the type of disorder as arthritis.

The third most commonly reported health problem was skin disorders with 11.5% of all respondents choosing to answer this question indicating that their Anatolian Shepherd Dog was affected by skin disorders. Of the respondents that indicated their dog was affected 24.1% identified the type of disorder as demodectic mange, and 20.7% identified the type of disorder as seasonal allergies.

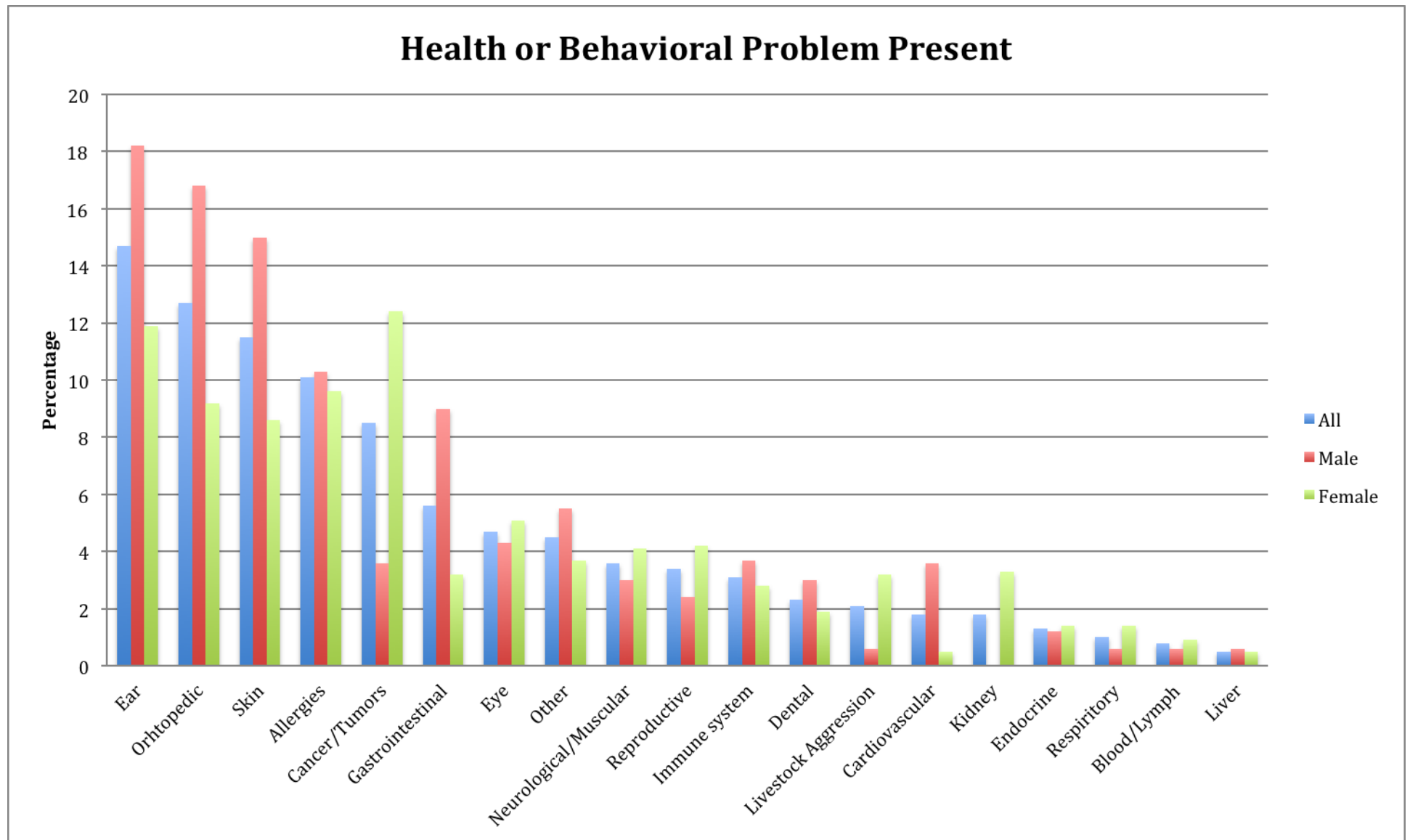


Figure 7. Histogram of type of health or behavioral problem present expressed as a percentage of total number of respondents to that particular question.

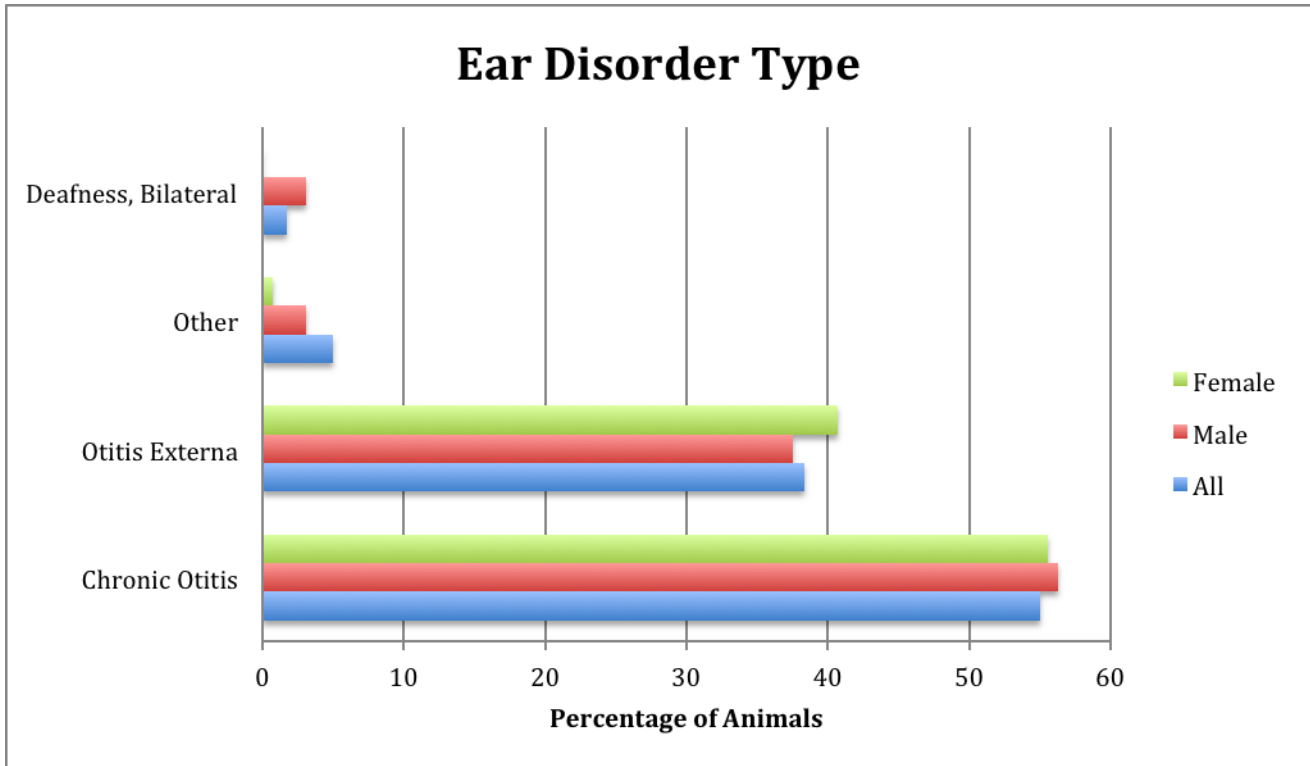


Figure 8. Histogram of type of ear disorder diagnosed expressed as a percentage of total number of animals reported to have a diagnosis of ear disorders.

The fourth most commonly reported health problem was allergic disorders with 10.1% of all respondents choosing to answer this question indicating that their Anatolian Shepherd Dog was affected by allergic disorders. Of the respondents that indicated their dog was affected 27.6% identified the type of disorder as food allergies, 19% identifying the type of disorder as atopy (inhalant) seasonal, and 22.4% identified the type of disorder as other.

Owners were asked to classify their dog's temperament at three different points in the dog's development, 0-12, 13-24 and >24 months of age. The most prevalent descriptors identified were confident, friendly and protective (>40% of total respondents), with reserved and very friendly making up the second tier (>13% of total respondents). There is a statistically significant increase in protective and dog aggressive behaviors from the younger to older age groups (Figure 12). This general trend is the result of statistically significant increases within the female population without significant increases within the male population. Timidity was also found to decrease as the dogs aged, with no significant differences between the two sexes.

Owners were asked to classify their dog's traits as a livestock guardian (Figure 13). The majority of respondents described their dog as having no problems (65% of total respondents). The next most common descriptions were excessive barking and high prey drive (>4% of total respondents) with the remaining descriptions being used infrequently (<2%).

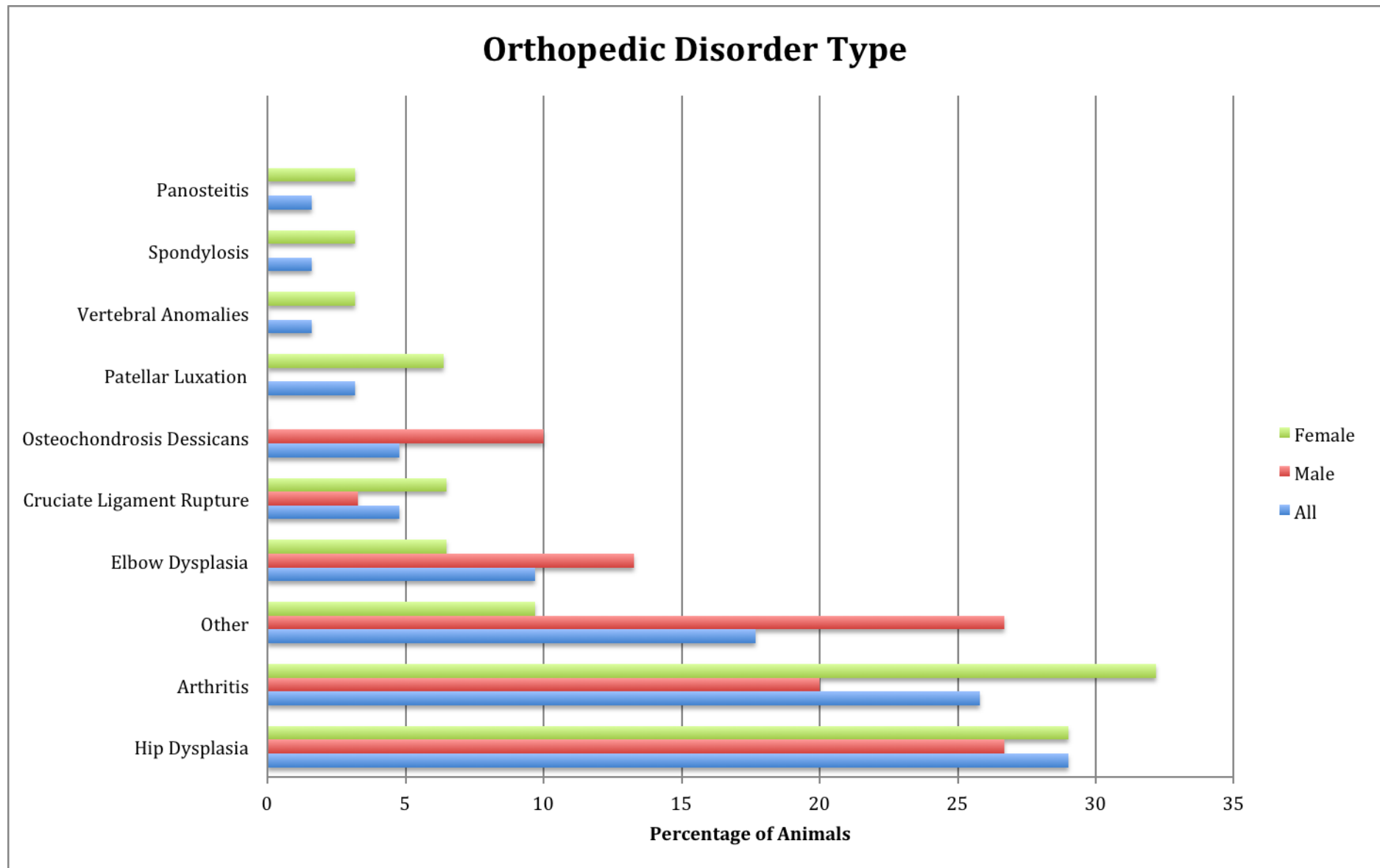


Figure 9. Histogram of type of orthopedic disorder diagnosed expressed as a percentage of total number of animals reported to have a diagnosis of orthopedic disorders.

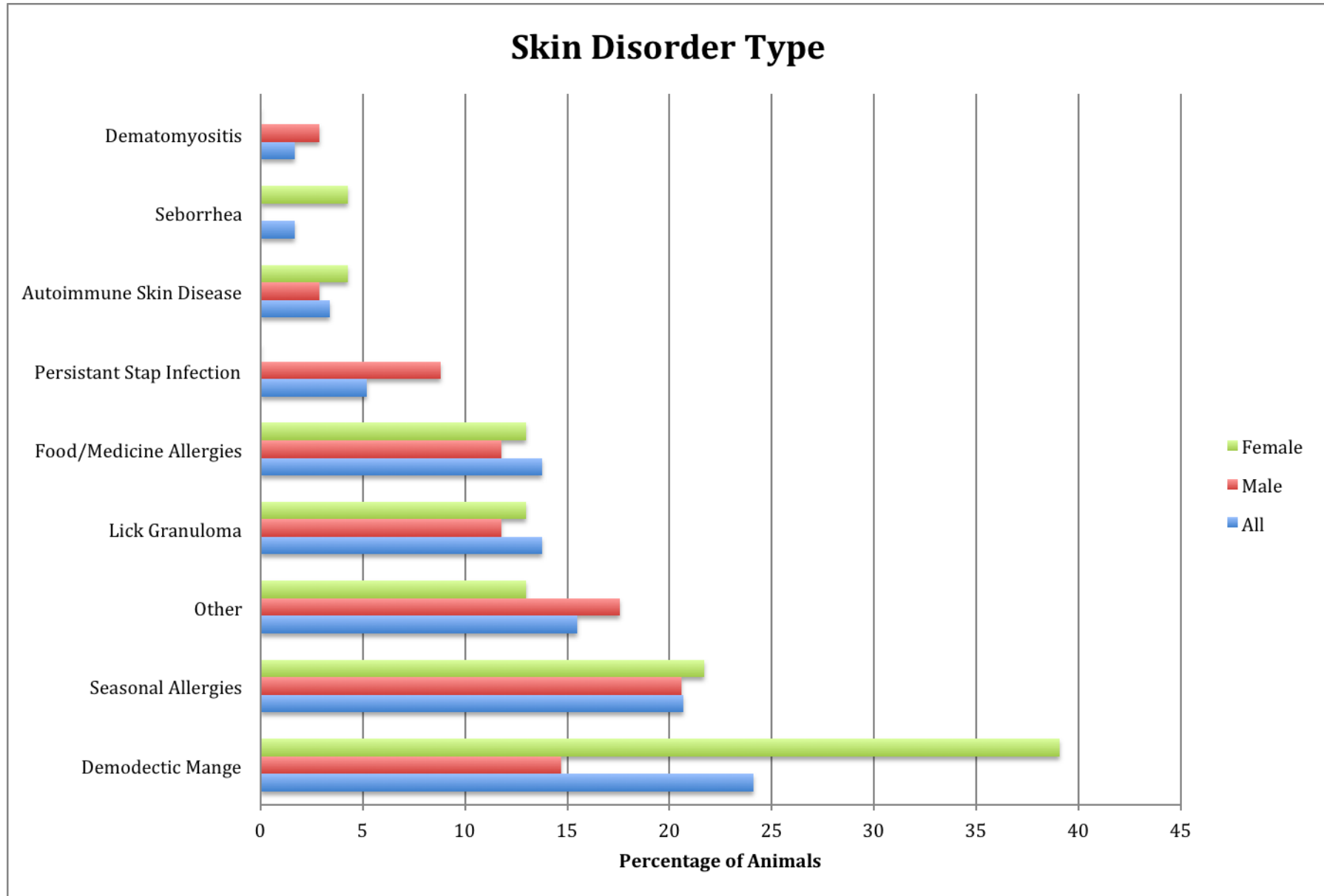


Figure 10. Histogram of type of skin disorder diagnosed expressed as a percentage of total number of animals reported to have a diagnosis of skin disorders.

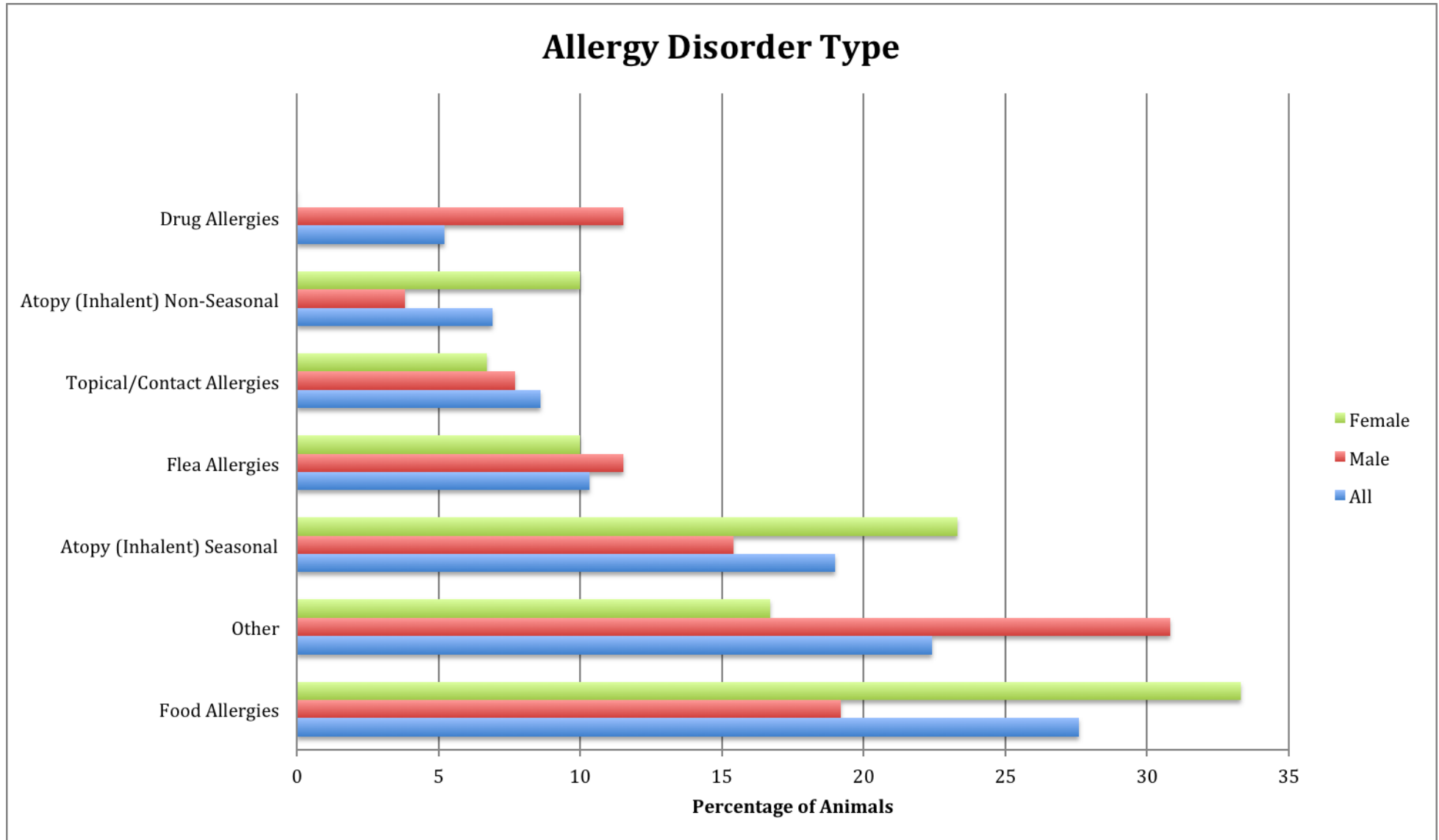


Figure 11. Histogram of type of allergy disorder diagnosed expressed as a percentage of total number of animals reported to have a diagnosis of allergy disorders.

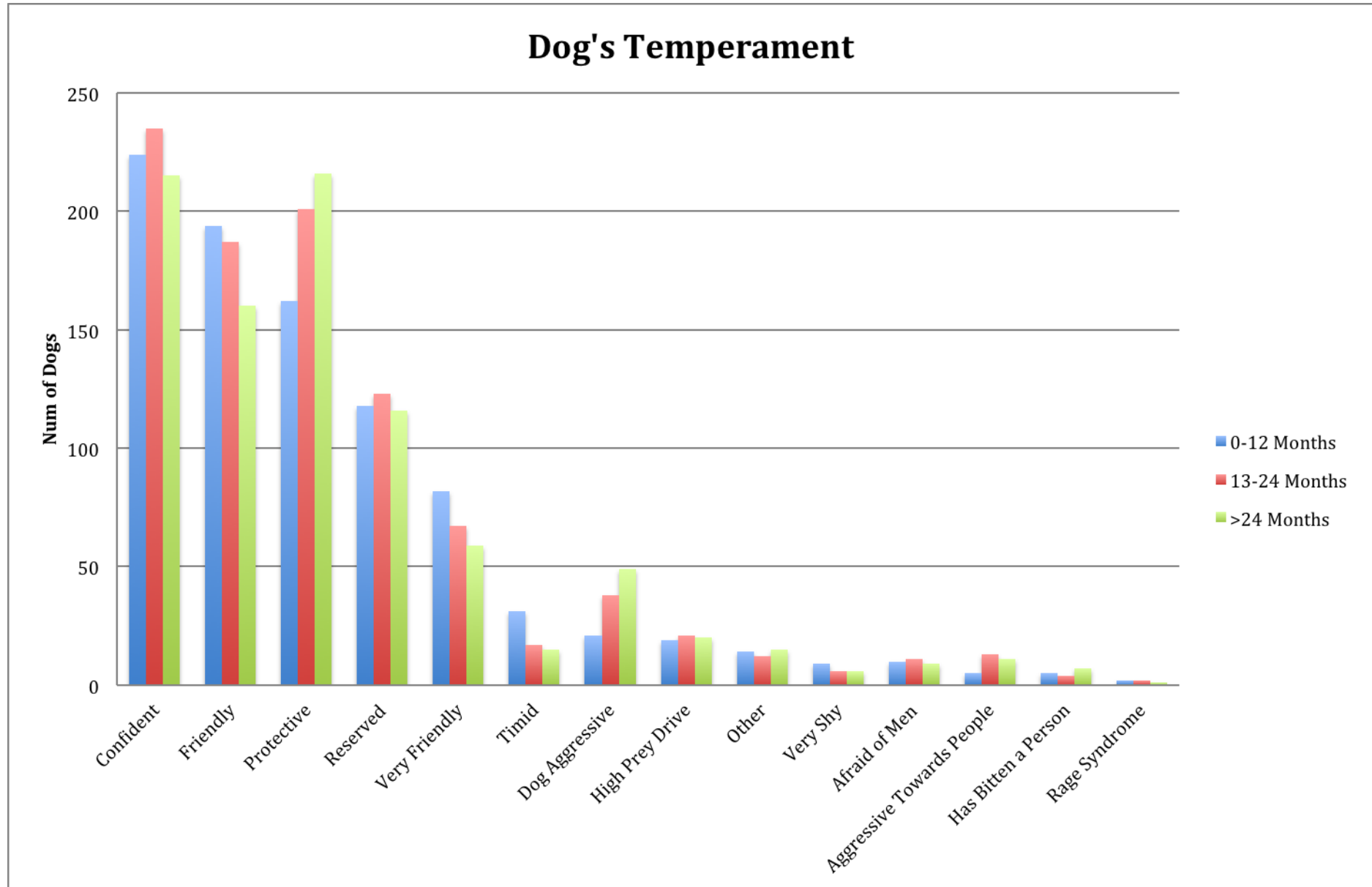


Figure 12. Histogram showing the numbers of dogs who were described by their owners as having a certain type of temperament at 0-12 months, 13-24 months and >24 months of age. Multiple temperament descriptors could be used for each dog in each age range.

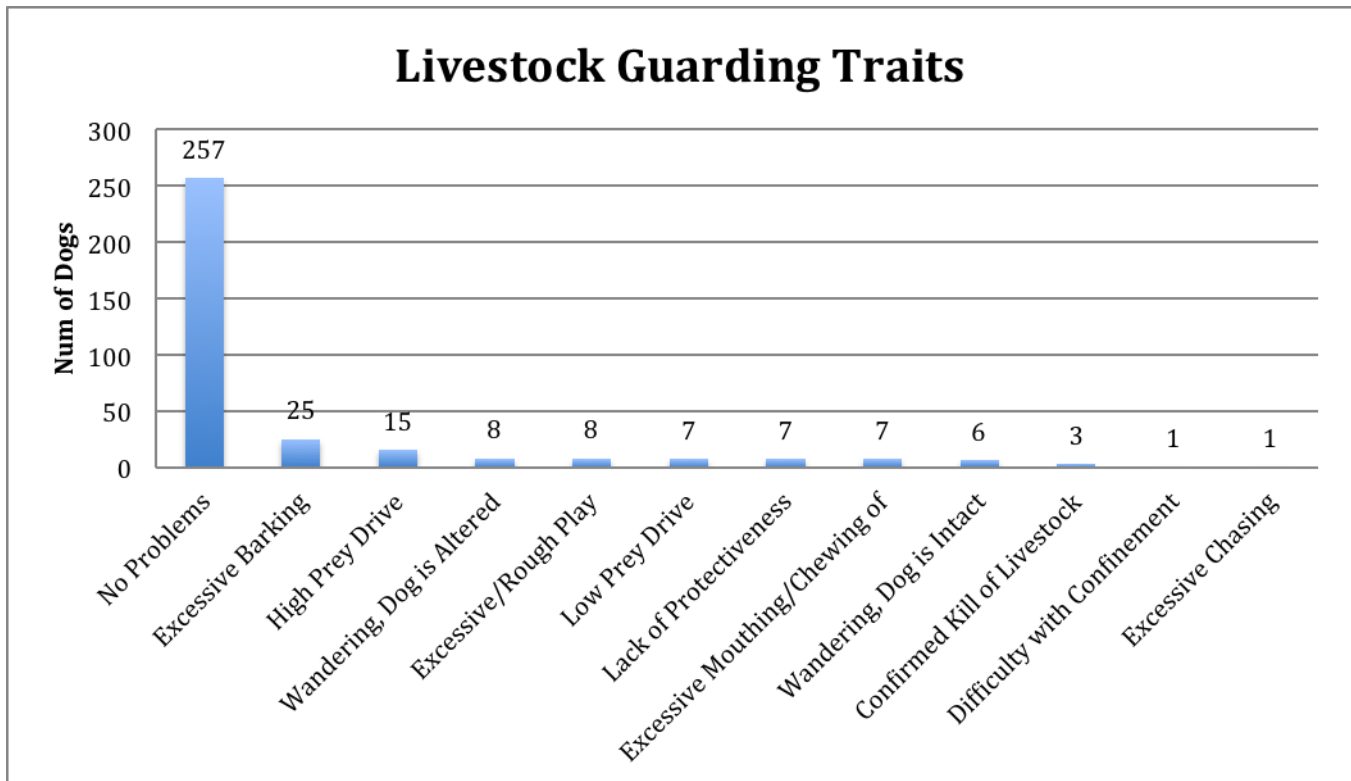


Figure 13. Histogram showing the number of dogs who were described by their owners as having a certain type of livestock guarding trait. Multiple descriptors could be used for each dog.

Lifestyle and Prophylactic Treatments:

Survey participants were asked to identify type of diet fed to their Anatolian Shepherd Dog based on four choices. (See Figure 14.) Participants were allowed to choose as many food types as desired and there is no means of determining primary vs. secondary food types. The most common type of food fed was dry food. The three remaining food types were fed with roughly equal frequency.

Survey participants were asked if they treated their Anatolian Shepherd preventatively for fleas, ticks and heartworms (See Figure 15). Of those that responded, significantly more respondents (83.1%) treat for heartworm than do not (11 abstentions). The difference between those that do and do not treat for ticks and for fleas was not statistically significant. Owners were also asked if their Anatolian Shepherd Dog was vaccinated regularly. Significantly more responded “Yes” (89.2%) and of those that responded, a significantly low number (5.4%) reported an adverse reaction to those vaccines.

For those that reported vaccinating their dog (344), the following specific vaccines were utilized (See Figure 16). The vaccines used in greater than 92% of respondents were Rabies, Parvovirus and Distemper. Hepatitis, Leptospirosis, and Bordetella were used in 56-42% of respondents. Lyme and Coronavirus vaccines were used in approximately one quarter of the respondents. Nosodes and other vaccines were used in <3.0% of the dogs surveyed. No information is available on the types of “other” vaccines used.

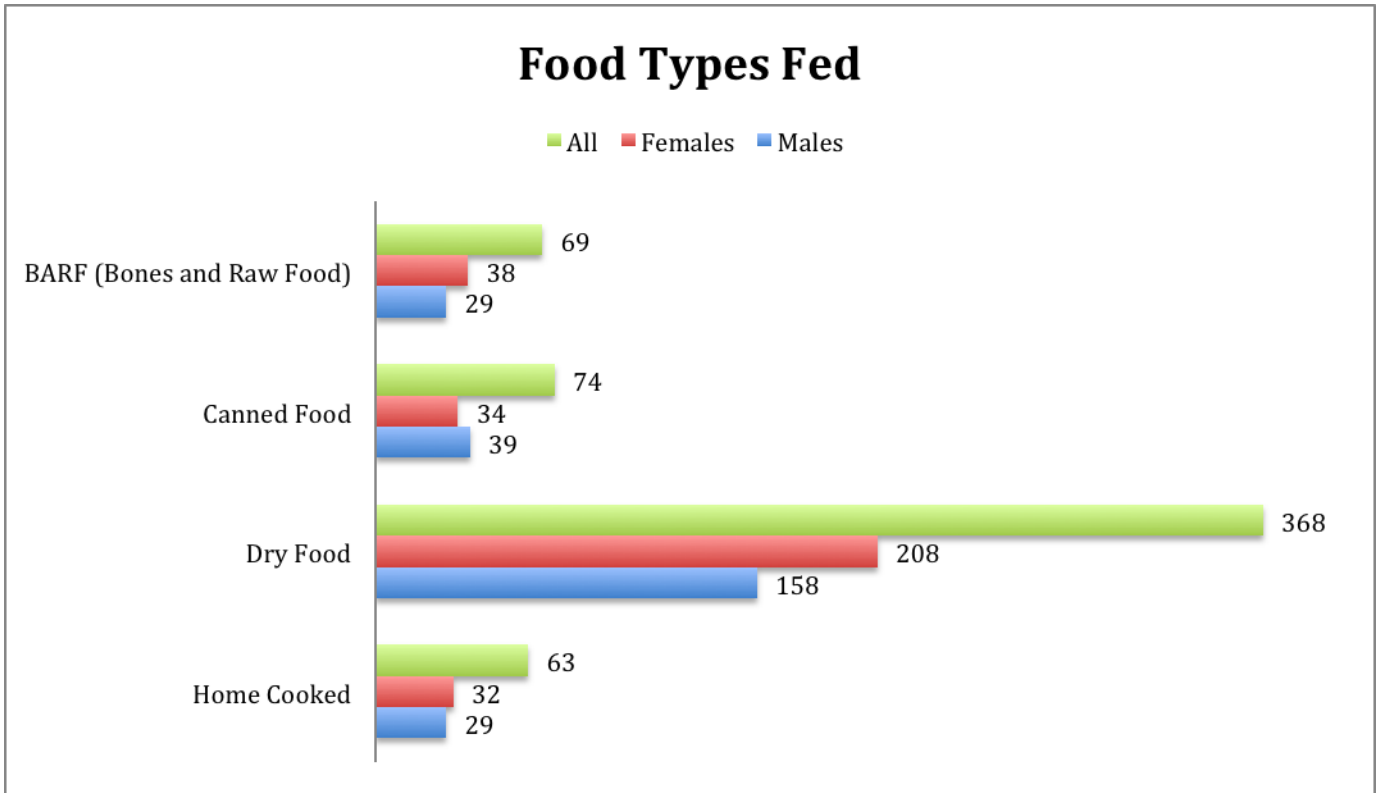


Figure 14. Histogram showing frequency (as number of dogs) of dogs that were fed a particular type of diet. Respondents were able to choose multiple food types so the total displayed across the food types is greater than the total number of respondents (397).

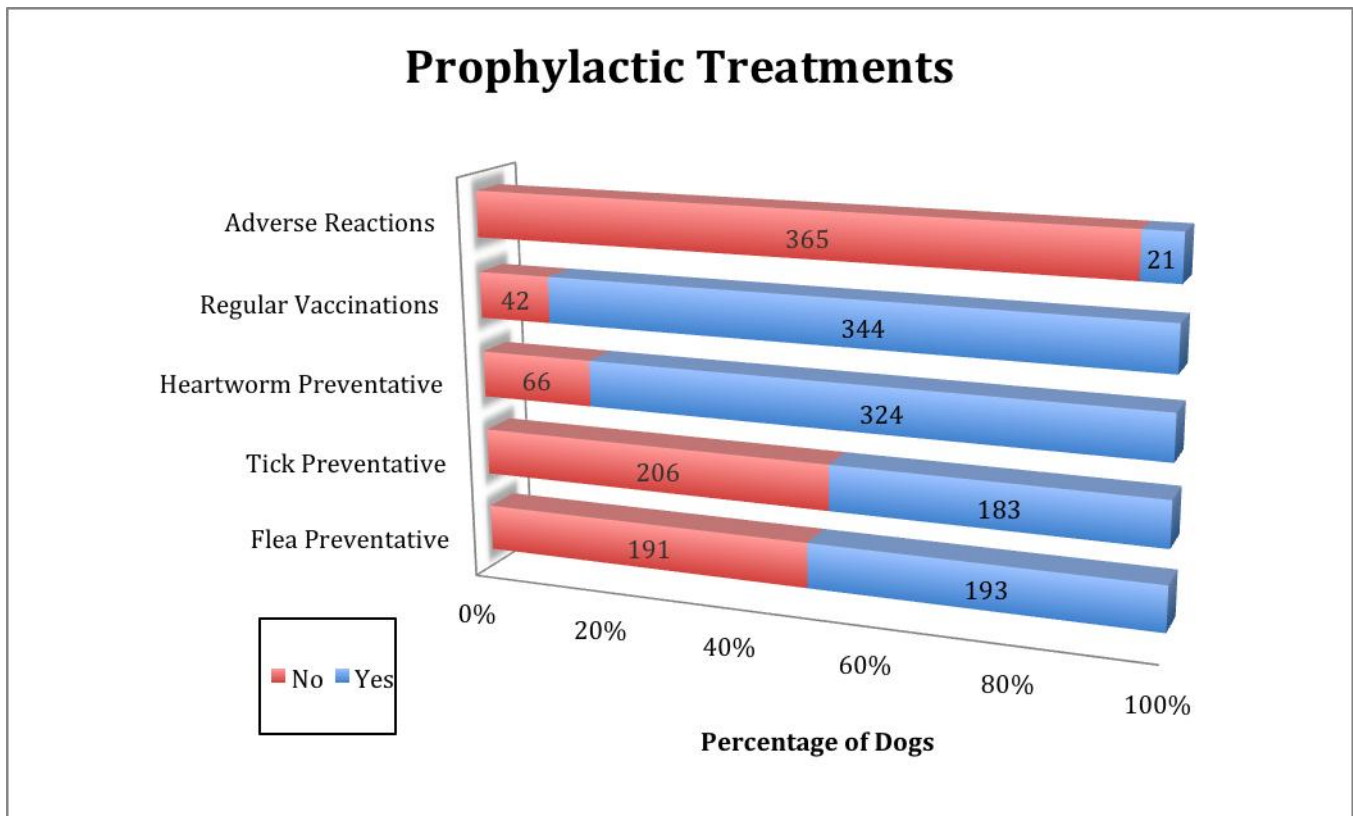


Figure 15. Histogram showing frequency (as number of dogs) of dogs that were treated with a given prophylactic treatment.

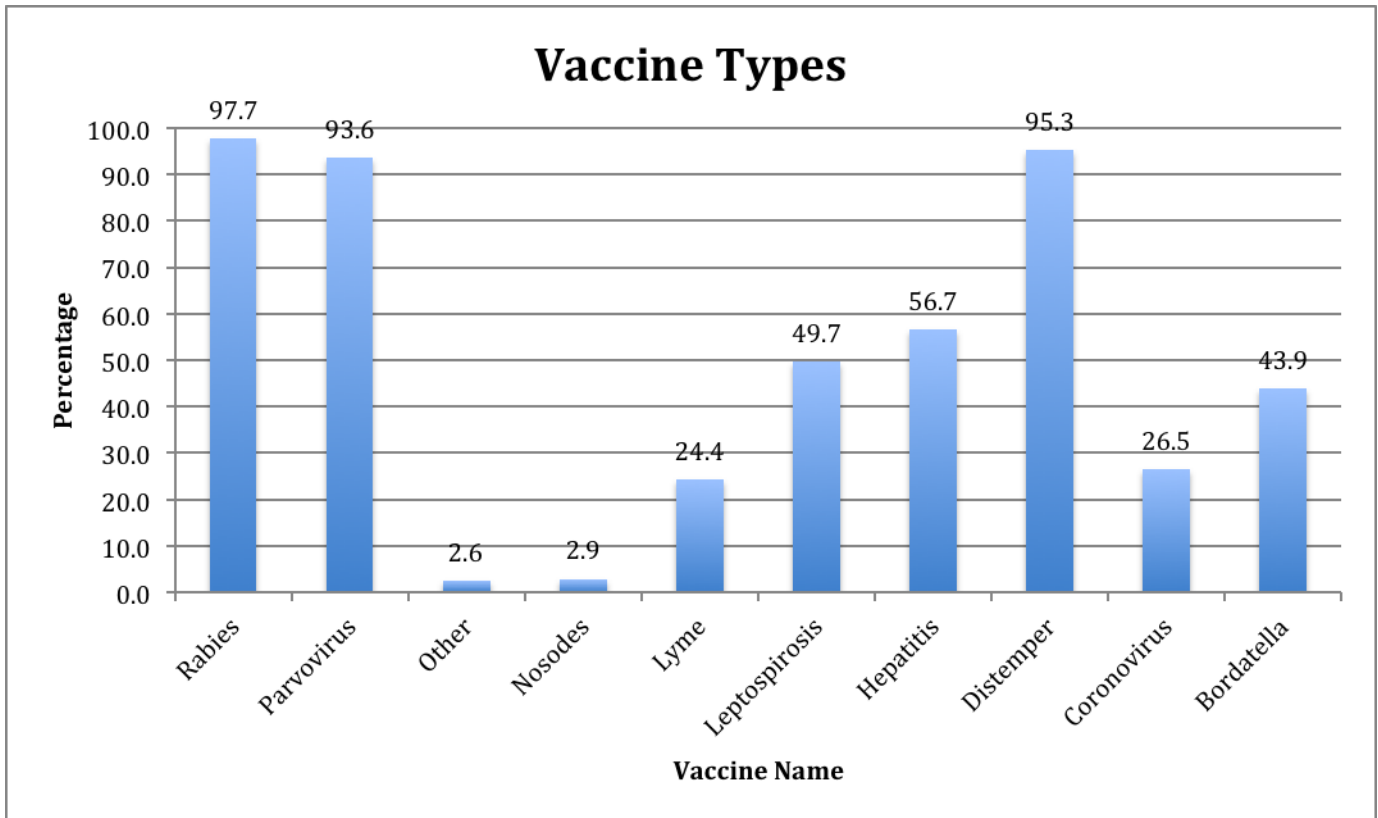


Figure 16. Histogram showing percentage of dogs that were given a particular vaccine. Percentages are calculated relative to the number of respondents that reported giving regular vaccinations (344 dogs).

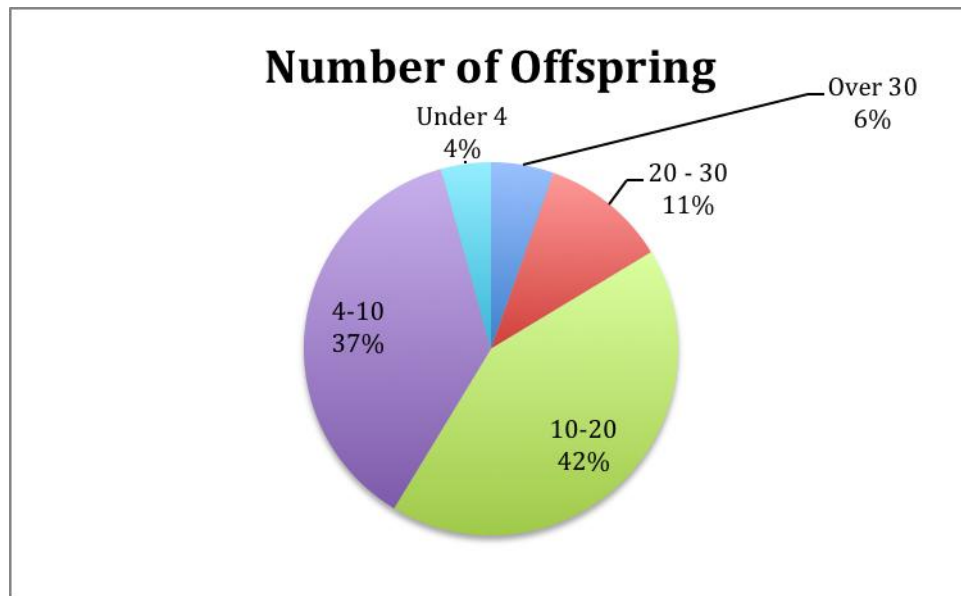


Figure 17. Chart representing the number of offspring produced by those reproductively active Anatolian Shepherd Dogs surveyed.

Of those that responded, 85% run titers on their dog (42 total respondents), although no information on the specific titers run was provided. Of that set, 50% follow an every two year schedule for running titers, although it is difficult to draw conclusions as only 14% of those who answered the initial titer question responded to the scheduling question.

Owners were asked with their dog had ever produced puppies. Of those that responded (396 out of 397), 23.4% answered yes and 76.3% answered no. Of those that answered yes, the owners were asked to provide more detail on the total numbers of puppies produced by their dog (Figure 17). The most common ranges were 10-20 puppies (42%) and 4-10 puppies (37%).

Genetic Health Screening:

Survey respondents were questioned regarding genetic health screening programs in which they participated. (See Figure 18.) The most common screening program used by participants was OFA hip evaluation with 41.5% of either gender, 33.1% of males and 48.4% of females being screened. 7 respondents abstained from answering the question. The two next most common screening programs were used with roughly equal frequency: OFA elbow dysplasia screening was used by 17.5% of either gender, 15.6% of males and 19.1% of females. 9 respondents abstained from answering the question. OFA (or other) thyroid screening was used by 16.0% of either gender, 11.9% of males and 19.3% of females. 9 respondents abstained from answering the question. CERF examination, other hip evaluations, and OFA Patellar Luxation examination were each used by less than 10% of survey respondents.

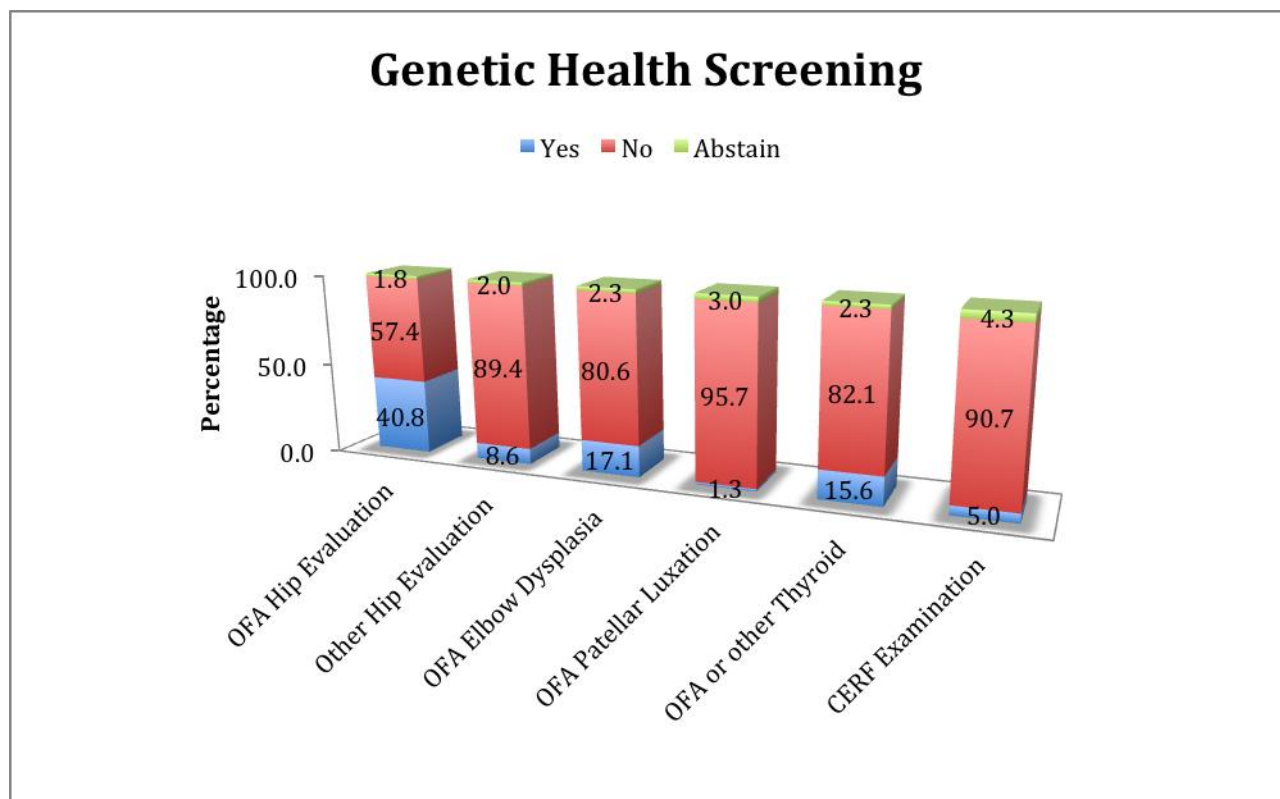


Figure 18. Histogram showing percentage of dogs for which a given type of genetic screening was performed.

Of the 162 participants who had an OFA hip evaluation, 14 (12.5%) were graded as dysplastic, 144 as not dysplastic (87.5%), and 2 as borderline (0.9%). Two of the participants chose not to answer regarding the hip grade. (See Figure 11.)

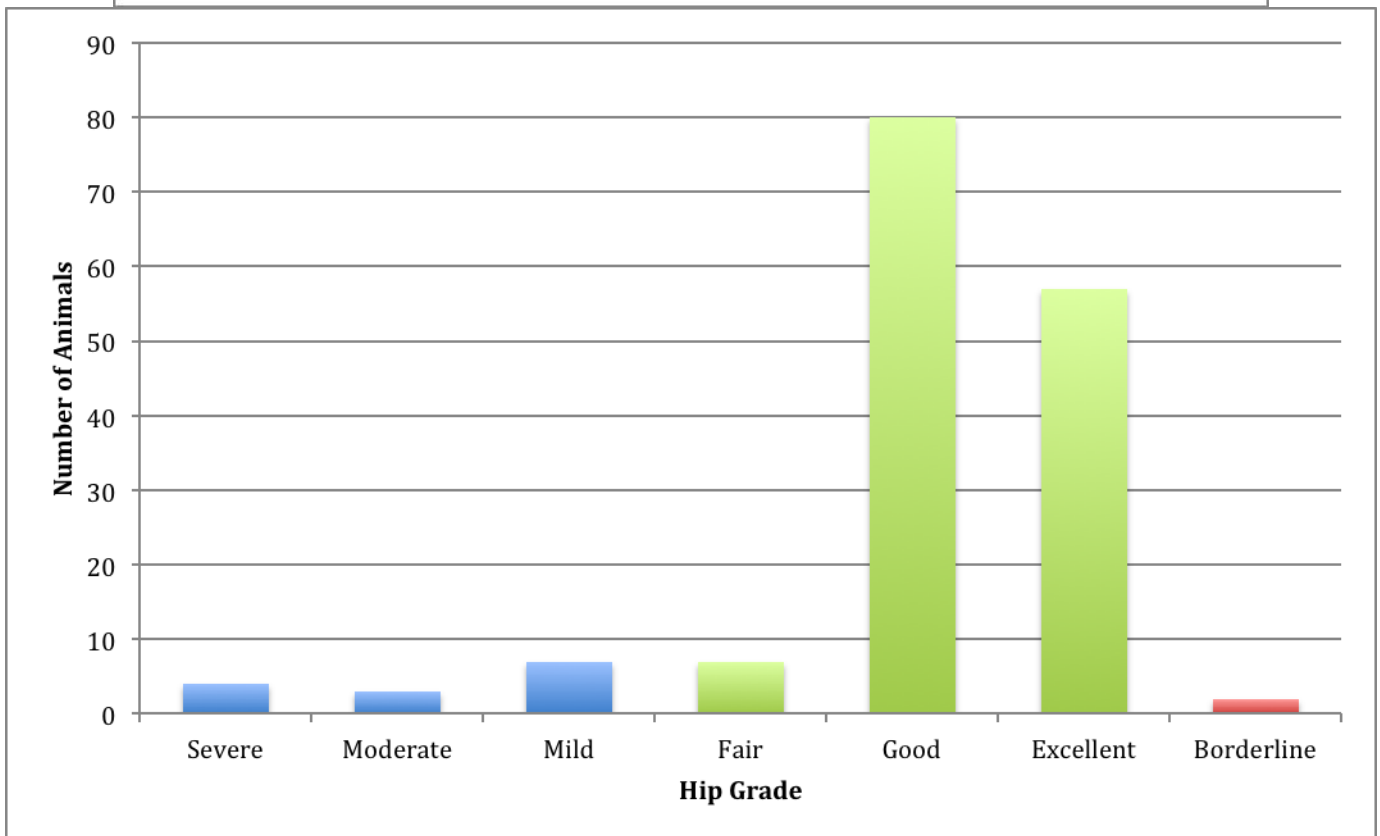
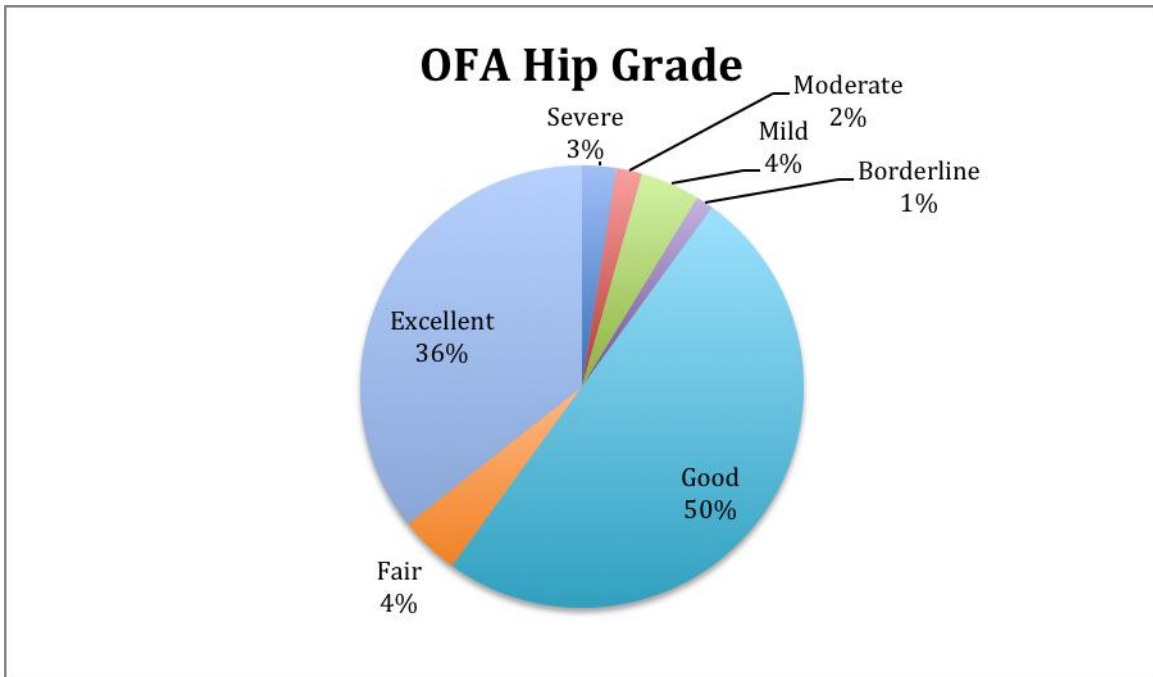


Figure 19. OFA Hip Grades Represented in both absolute number of respondents and percentage of participants in the OFA grading scheme.

Of the 34 (8.6%) participants who had a hip examination by another organization, 9% used a PennHip evaluation, 2% used an OVC evaluation, 22% used some other organization and 1 person chose not to identify the other organization.

Of the 68 participants who had an OFA elbow evaluation, 2 (3%) were graded as Grade 1 elbow dysplasia and 64 as normal (94%), Two of the participants chose not to answer regarding the elbow grade.

Of the 62 participants who had an OFA thyroid evaluation, 2 (3%) were graded as ideopathically reduced thyroid function, 2 (3%) were graded as equivocal function, and 55 as normal (94%). Three of the participants chose not to answer regarding the thyroid function grade.

Of the 5 (1.35%) participants who had an OFA examination for patellar luxation 4 (80% of those examined) were identified as patellar luxation free. Of the 20 (5%) participants who had an CERF examination, all were certified CERF normal.

Summary:

Study design: Beyond the information presented above, addition analyses of the data would require an estimation of the total population of Anatolian Shepherd dogs to be represented by the study. Determining this information would require analysis of the ASDCA registrar's records. These data could then be used to determine if the sample size obtained (i.e. number of respondents) was sufficient to represent the overall population of Anatolian Shepherd dogs.

Ideally, the estimation of total population and desired sample size would be established before the survey was sent to owners. In addition, the composition of the sampling group will need to be determined up front in order to adequately represent the total population (see sampling bias point below). Working with a professional organization would be our best method of establishing the most appropriate study design for future studies.

Potential sampling bias: there were significantly more (p value < 0.05) female than male Anatolian Shepherd dogs represented in the survey. Additionally, data relating to the deceased male and female dogs showed significantly more deceased female than male dogs, even once corrected for the overall greater number of survey results received regarding female Anatolian Shepherds. It is unclear if the deceased female animals would cause sampling bias, but it is conceivable that if morbidity data were higher in this group, that sampling bias would exist. Future survey design should prioritize identifying causes and ways to limit sampling bias to allow for more meaningful data analysis.

General Data: Analysis of the relationship between gender and neutering provided data that was different for the only other published Anatolian Shepherd Dog health survey. Our study found that for either male or female dogs, there were significantly more intact than neutered animals. However, there was no statistical difference in the probability of an Anatolian being neutered based on its gender. The Kennel Club/British Small Animals Veterinary Association Scientific Committee survey done in 2004 found that significantly more females than males were neutered.^{i,ii}

Mortality data: future surveys might consider asking for an age of death rather than providing age range choices, as this would allow for additional data analysis options. Furthermore, identifying the cause of death, at least in terms of broad organ system groupings, and other known major causes such as toxicity and trauma would allow the cause of death data to be associated with age at death. More detailed analyses could also be performed if the survey provided a method to anonymously identify

each animal and thereby correlate the age of death of a specific animal with the cause of death. This would also hold true for morbidity data (disease questions and age of onset of disease for example).

Morbidity data & Genetic testing data: data from this section of the study was difficult to analyze. Major discrepancies exist between our data and the data currently published via the OFA website and on the ASDCA website. Certain types of diseases could have been categorized in more than one section or not at all.

The Anatolian Shepherd Dog Health Handbook states that entropion and ectropion is present in most—if not all—Anatolian Shepherd breeding linesⁱⁱⁱ, however, this health survey only identified 15 affected animals, or 3.8% of total respondents. This could indicate that the disease is underrepresented in this survey sample, that this survey inadequately identified affected animals in this survey sample or that the disease is less widespread than previously thought.

Immune mediated hypothyroidism was identified by 4 (1%) of survey respondents in the diagnosis section of our survey and 0% of respondents in the genetic screening portion of our survey. OFA indicates the presence of this disease in 5.4% of their 93 samples to date.^{iv} Conversely, idiopathically reduced thyroid function was reported by 2 (0.5%) of our survey respondents in the genetic screening portion of our survey. OFA data indicate the presence of this disease in 0% of their 93 samples to date.ⁱⁱ

Hip dysplasia data from the OFA indicate dysplastic findings in 10.4% of evaluations^v, but only 4.5% of total respondents in the current study identified hip dysplasia presence in the health disorder section. In the genetic screening section of the survey, the combined dysplastic percentages were 9%, which more closely agree with the OFA data. Furthermore, OFA indicated excellent hip scores in 18.2% of Anatolian Shepherd Dogs, whereas 36% of our survey respondents who indicated that they had completed OFA hip screening reported a hip score of excellent.

Even more striking, OFA indicated elbow dysplasia presence in 5% of evaluations^{vi}, but only 1.5% of total survey respondents identified elbow dysplasia as a health disorder present in their animal. Furthermore, of the respondents that indicated that OFA elbow screening had taken place, only 0.5% identified the screening results as Grade 1 dysplastic when 4.7% are listed as such on the OFA website.^{vi} This appears to indicate a trend that the current health survey will likely underestimate the prevalence of certain types of disease. However, **the current survey may also overestimate the prevalence of some diseases, as seen** with the idiopathic thyroid disease data. It will be important for further surveys to determine if this is due to the means of sampling or collecting the data, question design, concerns regarding confidentiality or some other means of data bias.

In terms of data capture, 382 OFA elbow screenings are listed on the OFA website from January 1974 through December 2010^{vii}. Of these screenings, we represented 68 (17.8%) in our survey. OFA reports 1635 hip screenings in the same time period. Of those screenings, we represented 162 (9.9%) in our survey. Finally, OFA reports 93 thyroid screenings, and we represented 62 (66.7%). As thyroid screening has become more common lately, and our survey was answered by 2/3 of those persons, it may be that the discrepancy in hip and elbow numbers is due to the inability to contact persons represented by the more historical data.

Finally, the number of total survey respondents was 397, but the actual number responding to a given question varied, from 397 to 381. Likewise, even after identifying the presence of a disease state in their animal, type identification was generally not completed by all who responded positively to the

disease presence. Other complicating and confusing factors include: Hypothyroid disease was classified and available as a choice under both endocrine and immune mediated diseases in the diagnosis section of our survey. While either classification could be considered valid, interpreting whether 4 animals (immune mediated thyroid disease) 5 animals (hypothyroid) or 9 animals (the total of both) of the 397 survey participants actually had hypothyroidism is impossible.

Lifestyle and Prophylactic Treatments: The numerical data from this section provide an overview of the general husbandry of the Anatolian Shepherd Dog within the survey population. Unfortunately the write-in section of this portion of the survey produced a very large amount of data that were not readily analyzable. As a result, these data were not included in the current summary report.

Conclusions: The scope of this survey is the most to date comprehensive both in terms of types of questions posed and survey sample size published regarding the Anatolian Shepherd Dog. While inconsistencies exist between these data and other published sources, that fact does not negate the value of this survey. We have generated meaningful information about disease prevalence, husbandry, morbidity and mortality for the Anatolian Shepherd Dog. Most importantly, we now can identify design flaws and potential sources of bias unique to our desired study population. This will allow the ASDCA to design or commission professionals to design additional studies to improve upon this study. This study also provides the framework for ASDCA participation in AKC programs such as: breed enrollment of the Anatolian Shepherd Dog in the CHIC database program, CHIC DNA Database sample collection programs, and improved distribution of donor advised funds via the Canine Health Foundation.

ⁱ <http://www.thekennelclub.org.uk/item/549>

ⁱⁱ <http://www.thekennelclub.org.uk/download/1501/hsanatolianshepherddog.pdf>

ⁱⁱⁱ www.asdca.org, Health and the Anatolian Shepherd Dog, Health Handbook Link

^{iv} http://www.offa.org/stats_thyroid.html

^v http://www.offa.org/stats_hip.html

^{vi} http://www.offa.org/stats_ed.html