

# Results of a Pet Rabbit Health Information Survey

Moore, LC 2014

**Note: My intent in writing this report is to present information in a manner that may have some practical value to veterinarians, shelter operators, rescue volunteers, and other persons interested in pet rabbit health and care. Therefore, although I provide enough technical information on my methodology to allow those with a scientific background to judge the validity of the results, the report as a whole is not written in the manner of a traditional scientific paper. (For example, although p values are provided, other statistical values are not listed.) Readers are welcome to cite the results of this study provided proper credit is given.**

Though the number of pet rabbits is increasing in several countries, there is still a lack of knowledge about pet rabbit husbandry and disease. To collect data on pet rabbit husbandry and health, a pet rabbit health information survey was designed and disseminated to pet rabbit owners through internet sites. The self-selected respondents were generally motivated, attached to their rabbits, English-speaking, and educated. This bias may have enhanced survey accuracy, as respondents were likely to seek veterinary care for their rabbits and to be knowledgeable about rabbit care and health issues. Two hundred ninety (290) questionnaires were completed and returned; all returned forms were suitable for analysis.

The pet rabbit health information survey questionnaire consisted of ten pages, the first three containing general questions about the rabbit and its care; the last seven pages containing specific questions about rabbit diseases. Questions were primarily closed with multiple tick boxes for response, but some open-ended questions were included to encourage rabbit owners to share their thoughts and experiences. The initial questionnaire was designed by the author with input from Debby Widolf (then manager of the Bunny House at Best Friends Animal Sanctuary) and Kathy Smith, author of *Rabbit Health in the 21<sup>st</sup> Century*. This initial questionnaire was pre-piloted to several veterinarians and persons experienced in rabbit care. The amended questionnaire was then piloted to a group of rabbit owners. The face validity of the final questionnaire was tested by comparing written responses with phone interviews; the internal consistency of the questionnaire was tested by asking two questions in more than one place in the questionnaire. Confidence level was 95%; confidence interval (CI) was 5.76. The CI for individual questions was not calculated; for those unfamiliar with CI, the fewer respondents that give a particular answer to a question the more likely it is to be an accurate representation of the larger population. Most statistical tests performed were non-parametric descriptive and bivariate analyses (except where parametric tests were more appropriate).

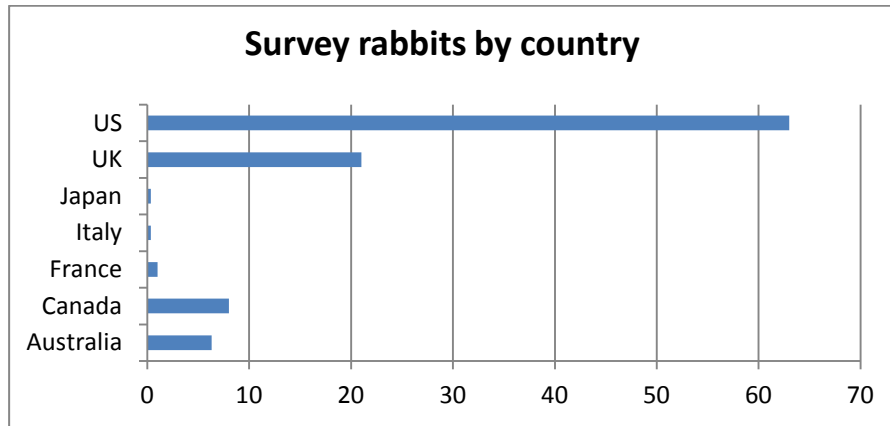
The most commonly reported health problem for the survey rabbits was gastrointestinal (GI) hypomotility (stasis), with 39% of survey rabbits reported to have had at least one episode. The number of reported incidences of GI hypomotility was compared to the inclusion/non-inclusion of eight dietary categories in the rabbits' diet (pellets, hay, greens, other vegetables, fruit, seeds/nuts, grains and treats) and analyzed. A statistically significant ( $p < 0.01$ ) relationship was found with the inclusion/non-inclusion of greens in rabbit diet and the number of reported incidences of GI hypomotility, with those rabbits not receiving greens in their diet having had significantly more episodes of GI hypomotility.

Other diseases reported for survey rabbits were eye disease (18%), soft stools (18%), points on cheek teeth (17%), fur mites (12%), sore hocks (12%), encephalitozoonosis (11%), abscesses (11%), arthritis (10%), urinary tract infection (10%), upper respiratory infection (10%), ear mites (9%), inner/middle ear infection (9%), and neoplasia (8%). Statistically significant relationships were found between age group and the presence of points on cheek teeth; the number of episodes of GI hypomotility and the presence of points on cheek teeth; and between maloccluded incisors and the weight of the rabbit. (Additional statistically significant findings are in the body of the report.)

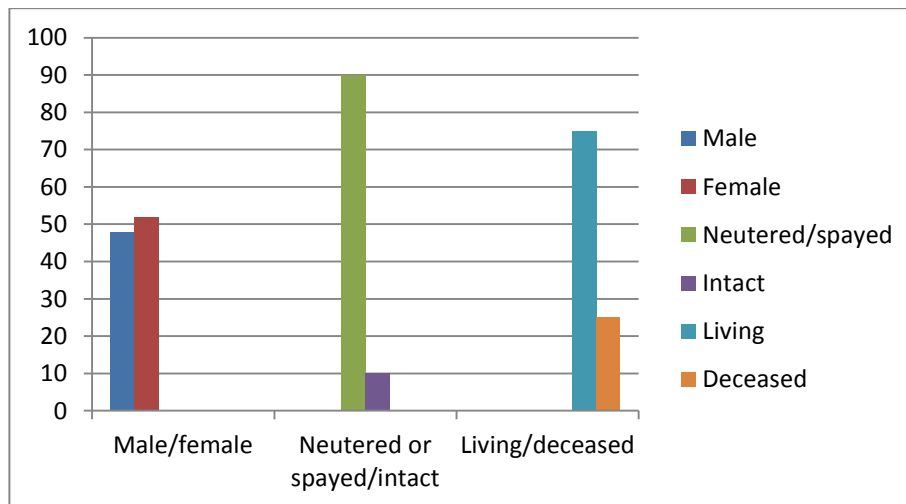
Although some wording changes would be recommended based on the responses to the questionnaire, the Pet Rabbit Health Information Survey was found to be a useful tool for collecting detailed information on pet rabbit husbandry and health. However, a better means for disseminating the questionnaire is needed, for the low sample size precluded analysis of specific breed/disease correlations in most cases.

## SURVEY RABBIT DEMOGRAPHICS (Frequencies in charts are relative and rounded to nearest percentage.)

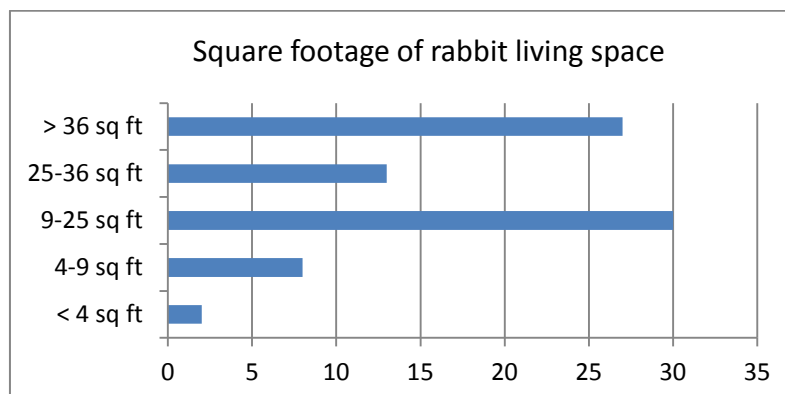
Most of the survey rabbits were pets in the US (63%), 21% from the UK, and lesser numbers from Canada, Australia, France, Italy, and Japan.



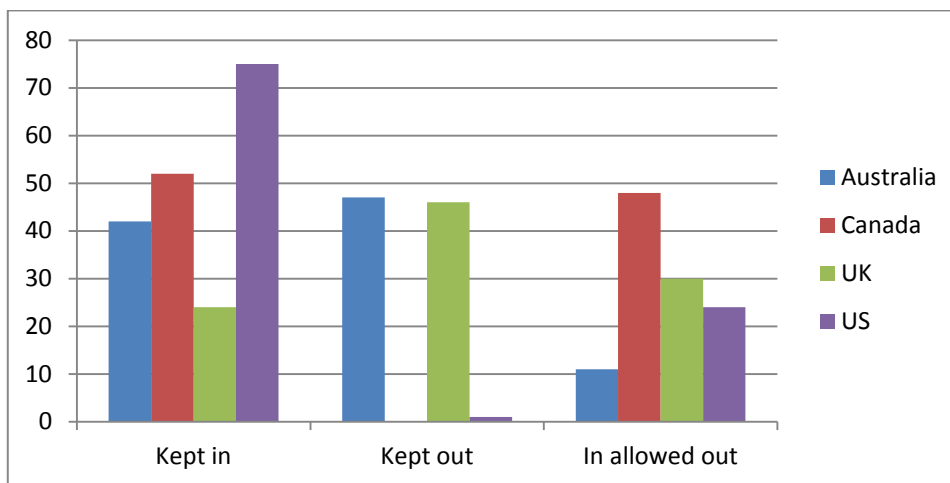
Seventy-five percent of the rabbit health surveys were filled out for living rabbits, 25% for deceased rabbits. Forty-eight percent of survey rabbits were male, 52% female; 90% had been spayed or neutered, 10% were intact.



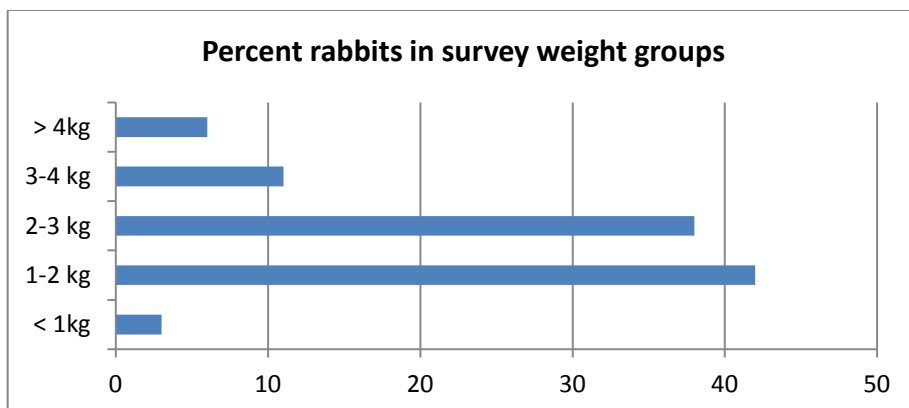
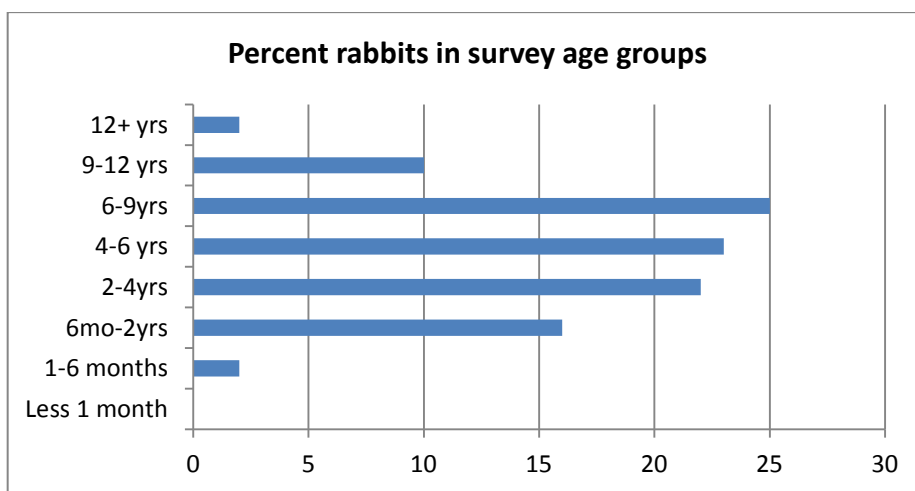
Most of the survey rabbits (87%) had been in the respondents' care for a year or more. The living area provided for the rabbits varied, with most having living space of 9-25 sq. ft. or more than 36 square feet.



Sixty percent of survey rabbits were kept inside, 14% outside, and 26% were kept mostly inside but allowed outside. Respondents in the UK and Australia were more likely to allow their rabbits outside than respondents from the US.



The majority of survey rabbits (70%) were between two and nine years of age at the time the respondent filled out the questionnaire and most (80%) weighed between 1-3 kg. (1kg=approx. 2.2 lb.)



A wide variety of breeds and breed mixes were represented in the survey, with the most common breeds reported being the Mini-Rex, Netherland Dwarf, Dutch and Mini Lop.

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## BREEDS AND MIXES REPRESENTED IN SURVEY RABBITS

The following list of breeds and mixes (with the number of rabbits of that breed or mix in the survey) includes both breeds recognized in the US and those recognized in other countries. A similar name does not imply an identical breed. For example, the Miniature Lop of the UK is not the same breed as the Mini Lop of the US, nor is the English of the UK the same breed as the English Spot of the US.

### KNOWN BREEDS:

American, 5	French Lop, 5
American Fuzzy Lop, 3	German Lop, 1
American Sable, 1	Harlequin, 10
British Giant, 1	Havana, 1
Californian, 8	Himalayan, 3
Cashmere Lop, 2	Holland Lop, 13
Chinchilla, Standard, 1	Hotot, 1
Continental Giant, 1	Jersey Woolly, 3
Crème D'Argent, 1	Lionhead, 11
Dutch, 16	Mini Lop, 19
Dwarf Cashmere Lop, 1	Mini-Rex, 23
Dwarf Hotot, 2	Miniature Lop, 3
Dwarf Lop, 4	Netherland Dwarf, 18
English, 1	New Zealand, 5
English Angora, 1	Palomino, 2
English Lop, 1	Polish, 5
English Spot, 3	Rex, 7
Flemish Giant, 3	Satin, 1
Florida White, 2	Silver Fox, 3
French Angora, 1	

### KNOWN MIXES:

Dutch/Holland Lop, 1	English Spot/Rex, 1
Dutch/Lionhead, 1	Lionhead/Rex, 1
Dutch/Netherland Dwarf, 1	Mini-Rex/Angora, 1
Dutch/New Zealand/American Fuzzy Lop, 1	New Zealand/Californian, 1
Dutch/Rex, 1	New Zealand/Rex/Mini-Lop, 1
English Spot/Holland Lop, 1	New Zealand/Silver, 1

### PARTIALLY KNOWN MIX:

Beveren mix, 1	Lionhead/up-eared mix, 4
Californian mix, 1	Mini Lop mix, 1
Chinchilla mix, 1	Mini-Rex mix, 2
Dutch mix, 2	Netherland Dwarf/unknown lop mix, 1
Dwarf Lop mix, 2	Netherland Dwarf/up-eared mix, 2
English mix, 3	New Zealand mix, 1
English Spot mix, 3	Rex mix, 1
Havana mix, 1	Rex /lop mix, 1
Lionhead/unknown lop mix, 2	Rhineland mix, 1

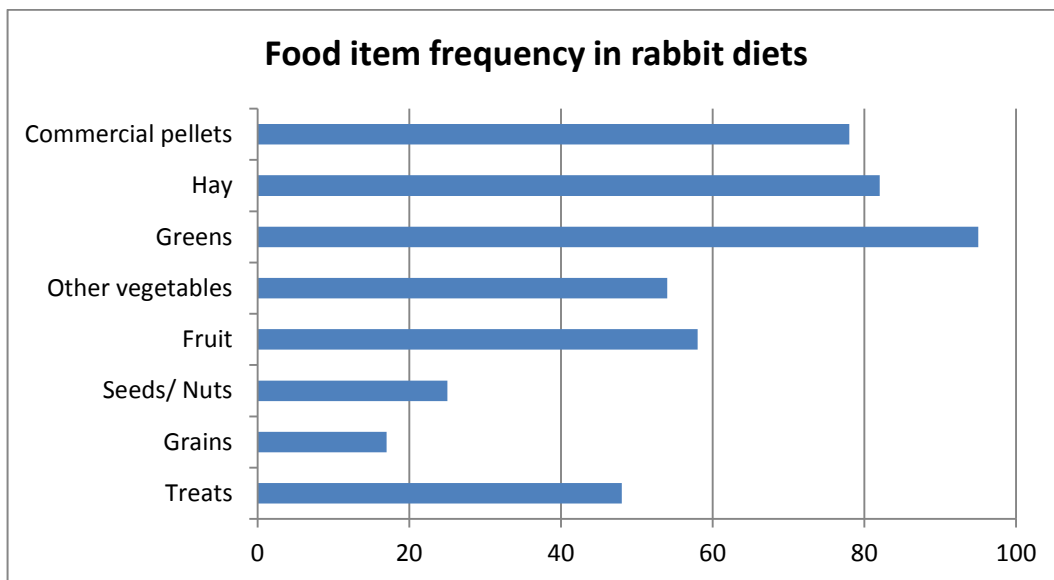
### UNKNOWN BREED OR MIX:

Unknown lop, 4	Unknown mix, 17
Unknown lop mix, 18	Breed or mix entirely unknown, 17

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## RABBIT DIET

Greens were the most commonly fed food item, with 95% of the survey rabbits being fed greens, followed by hay (82%), commercial pellets (78%), vegetables (54%), fruit (58%), nuts/seeds (25%), and grains (17%). Forty-eight percent of survey rabbits were given treats, which were defined in the questionnaire as including items such as papaya tablets, crackers, bread, and purchased treats.



Respondents were asked to give the daily amounts fed for each food category. Of those respondents who reported amounts, most (44%) fed from 2 tablespoons to ¼ cup of commercial pellets daily, with 21% feeding one cup or more. Thirty-nine percent reported feeding alfalfa-based pellets, 61% grass-based pellets. Most (65%) fed the rabbits unlimited hay, usually (81%) grass hay, with 19% of respondents feeding at least some alfalfa hay. Forty percent of the respondents who reported feeding greens fed more than 1 cup of greens daily, and 37% from ¼ cup to 1 cup of greens. Forty-four percent of those who fed other vegetables to survey rabbits gave between 1 tablespoon and 1 cup daily, most of those feeding fruit (43%) fed less than 1 tablespoon daily, the majority (74%) of respondents who fed seeds or nuts gave less than 1 teaspoon daily, 71% of those who fed grains gave between 1 teaspoon and 1 tablespoon, and most (62%) of the respondents reporting that they fed treats gave less than 1 tablespoon a day.

The feeding/not feeding of the various dietary items was compared with occurrences of the following diseases/medical conditions: urolithiasis, GI hypomotility (stasis), acute bloat, soft stools, and points on cheek teeth. No statistically significant differences were found in the results of the groups except that of the feeding/not feeding of greens and the number of occurrences (ranked) of GI hypomotility ( $p < 0.01$ ). Rabbits fed greens had significantly fewer reported episodes of GI hypomotility than those not fed greens.

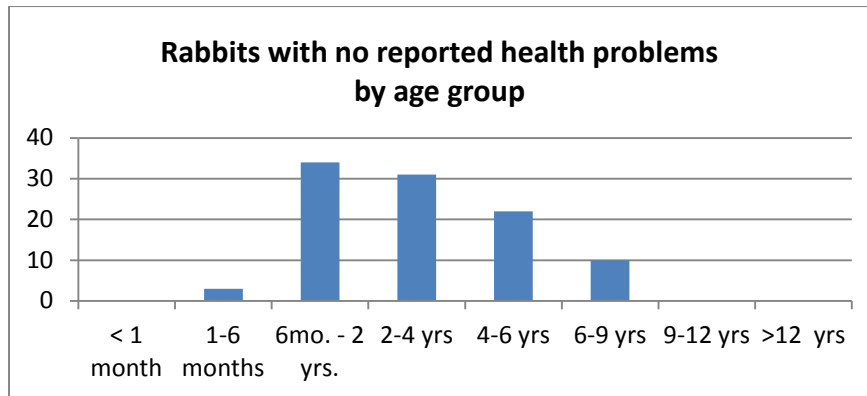
## REPORTED DISEASES AND MEDICAL CONDITIONS

The most commonly reported disease was gastrointestinal hypomotility, commonly known as “stasis.” The next nine most commonly reported diseases were eye disease (18%), soft stools (18%), points on cheek teeth (17%), fur mites (12%), sore hocks (12%), encephalitozoonosis (11%), abscesses (11%), arthritis (10%), urinary tract infection (10%), upper respiratory infection (10%). No incidences of toxoplasmosis, atherosclerosis, arteriosclerosis, rabbit calicivirus, or raccoon roundworm (which were included in the questionnaire) were reported for the survey rabbits.

## Diseases and medical conditions reported by survey respondents

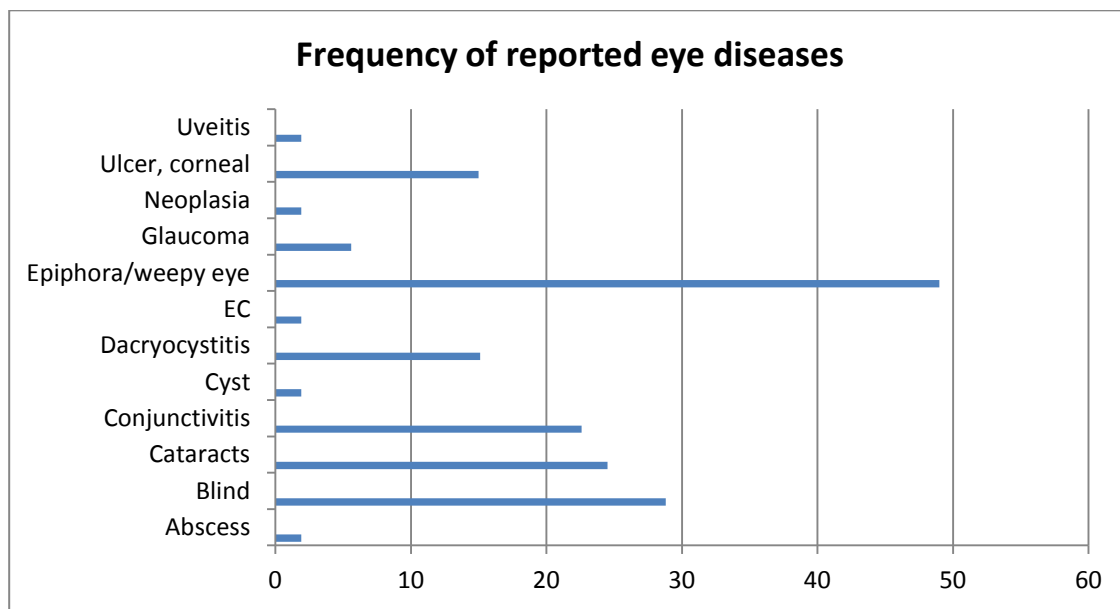
Diseases/medical conditions listed on survey	# reported incidences (290 survey rabbits)	Other reported diseases/ conditions	# reported incidences
Abscess	31	Adrenal disease	1
Acute bloat	11	Anal polyps	1
Arteriosclerosis	0	Anemia	1
Atherosclerosis	0	Anorexia	3
Bone fracture	10	Behavioral problem	2
Cardiomyopathy	6	Bell's Palsy	1
Cecum, impaction of	6	Birth defect	3
Cheek teeth (molars), points on	50	Brain lesion	1
Congestive heart failure	1	Bulging eye, undiagnosed	1
Diabetes	1	Bullae, thickening of	1
Diarrhea	18	Cecal dysbiosis	1
Dislocation	1	Choking, no cause diagnosed	1
Ear, inner/middle infection	26	Colibacillosis	2
Ear mites	26	Deaf	3
EC (encephalitozoonosis)	31	Dermatitis, peri-oral	1
Enterotoxemia	1	Enteritis	4
Eye disease	53	Fatty mass, abdominal	1
Fibroma	0	Fur loss	1
Fur mites	34	Gas	4
GI hypomotility (stasis)	113	Hay, inhaled	1
Head tilt (torticollis)	13	incontinence	1
Hyperthermia	3	Intestinal parasite, unknown	1
Hypothermia	20	Liver failure	1
Incisors, maloccluded	16	Liver lobe torsion	1
Intestinal coccidiosis	8	Mammary glands, infection	1
Mycotoxiosis	2	Mammary mass (undiag)	1
Myiasis	1	Megacolon	2
Myxomatosis	2	Molars, elongated roots	1
Neoplasia	23	Molars, maloccluded	1
Papilloma	3	Mucoid enteritis	1
Paralysis	11	Pancreatitis	1
Pinworms	2	Pasteurellosis	2
Pneumonia	5	Reaction to antibiotics	7
Rabbit calicivirus	0	Regurgitation	1
Raccoon roundworm	0	Splayleg	1
Renal failure	13	Spondylosis	7
Respiratory, other	11	Starvation/neglect	2
Soft stools	51	Underweight	5
Sore hocks	34	Urine scald	3
Stroke	1	Uterus, fluid-filled	1
Tapeworms	2		
Toxoplasmosis	0		
Upper respiratory infection, (URI)	28		
Urinary tract infection, (UTI)	11		
Urolithiasis	18		
UTI (urinary tract infection)	28		
Vent disease	5		
Warbles	2		

Nineteen percent of survey rabbits were reported to have no health problems. A statistically significant relationship ( $p < 0.001$ ) was found between age group and having no health problems. No statistically significant relationship was found between the feeding of any of the listed dietary items and having no health problems. The small sample size did not allow analysis of the relationship between breeds and no reported health problems.



## Eye disease

Eye disease was the second most commonly reported (18 %) disease in survey rabbits. Respondents most often reported “weepy eye,” a commonly used term for epiphora. Causes given for the epiphora included conjunctivitis, blocked tear ducts, upper respiratory infection, allergies, and pressure from an abscess and a tumor. Twenty-eight percent of the rabbits reported to have eye disease were reported to be blind in one or both eyes. Cataracts were the most frequently reported cause of blindness (40%) in the survey rabbits, with glaucoma (13%), ulcers (13%), EC (6%), abscess (6%) and born blind (6%) also reported as causes of lost sight.



## Inner/Middle Ear Infections

Nine percent of survey rabbits were reported to have had at least one inner-middle ear infection. One fourth of those rabbits were reported to have head tilt as a result.

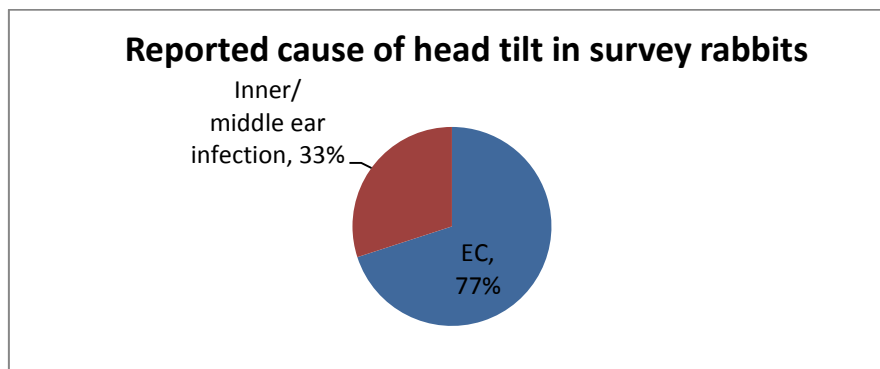
## EC (encephalitozoonosis, *Encephalitozooan cuniculi*)

Eleven percent of the survey rabbits were reported to have had EC. Treatment was reported to be successful for 45% of the rabbits having EC. Signs were reported to have recurred after initially being resolved in 19% of the rabbits with EC. Nine percent of the rabbits were reported to have shown no improvement after treatment. Another nine percent of the rabbits reported to have EC had tested positive but had exhibited no signs of the disease. These were reported to have been treated as a precaution. Thirty-two percent of the rabbits with EC were reported to have head tilt as a result of the disease.

Albendazole, Baytril, chloramphenicol, Lapidazole (fenbendazole), oxybendazole, Panacur (fenbendazole), and ponazuril were listed by respondents as drugs used in the treatment of EC by their veterinarians. The nine percent reported to have shown no improvement after treatment were all reported to have been treated with antibiotics only.

## Head Tilt (torticollis)

Seventy-seven percent of the rabbits reported to have head tilt had it as a result of EC, 33% from inner/middle ear infection.



## Fractures

Of the ten reported fractures, 7 were to the femur. The leg was amputated in three of the cases and set in the others. Other reported fractures were an elbow fracture, which was pinned, a broken toe, which was untreated except for providing the rabbit pain medication, and a broken hip, in which case the rabbit was euthanized.

## Dislocation

One dislocation was reported in the survey rabbits. The respondent reported the dislocation had occurred before the rabbit was rescued and was old enough that the dislocation had healed into a false joint.

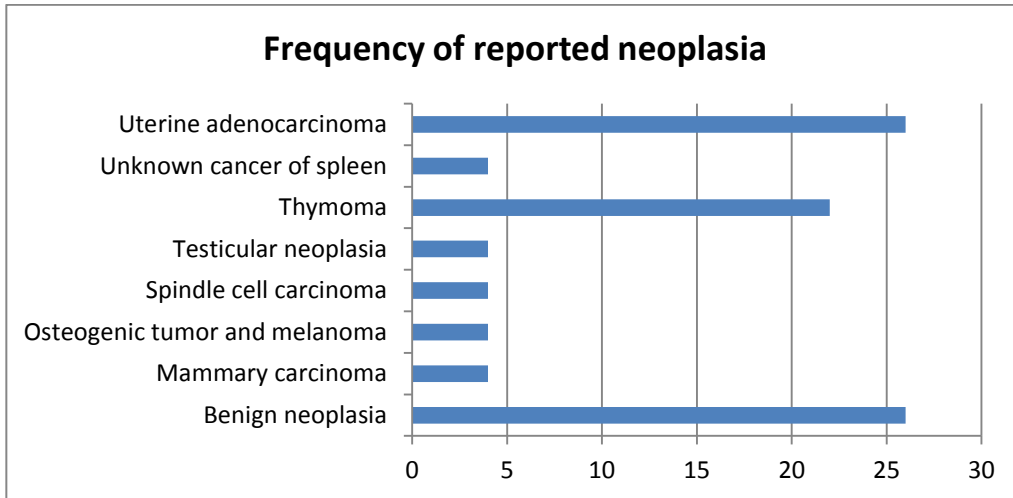
## Paralysis

Paralysis was reported in 4% of the survey rabbits. The paralysis was reported to have been temporary (caused by an infection or treatment for a disease) in 36%. The paralysis was caused by spondylosis in 27%, injury in 27%, and an unknown cause in ten percent.



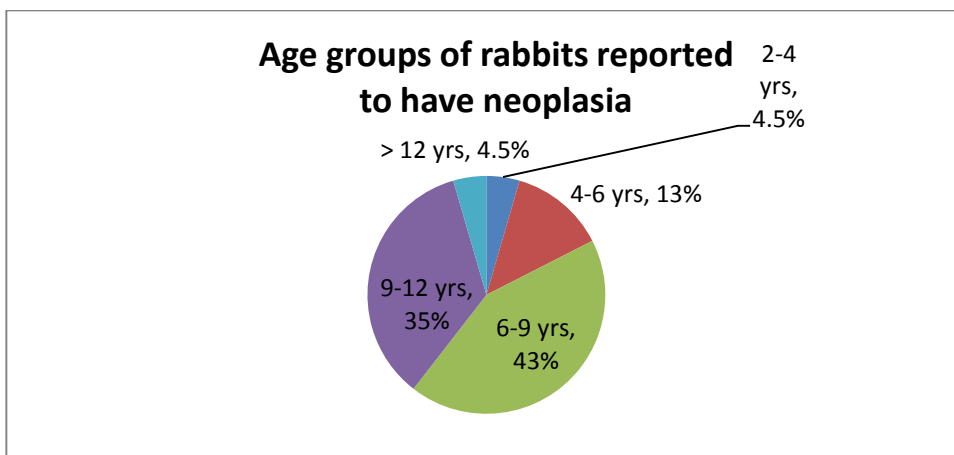
## Neoplasia

Eight percent of the survey rabbits were reported to have had neoplasia. Of these, 26% were reported to have been benign, 26% were uterine adenocarcinoma, and 22% thymoma. Other reported neoplasia included mammary carcinoma, osteogenic tumor and melanoma, spindle cell carcinoma, testicular cancer, and an unknown malignant neoplasia of the spleen.



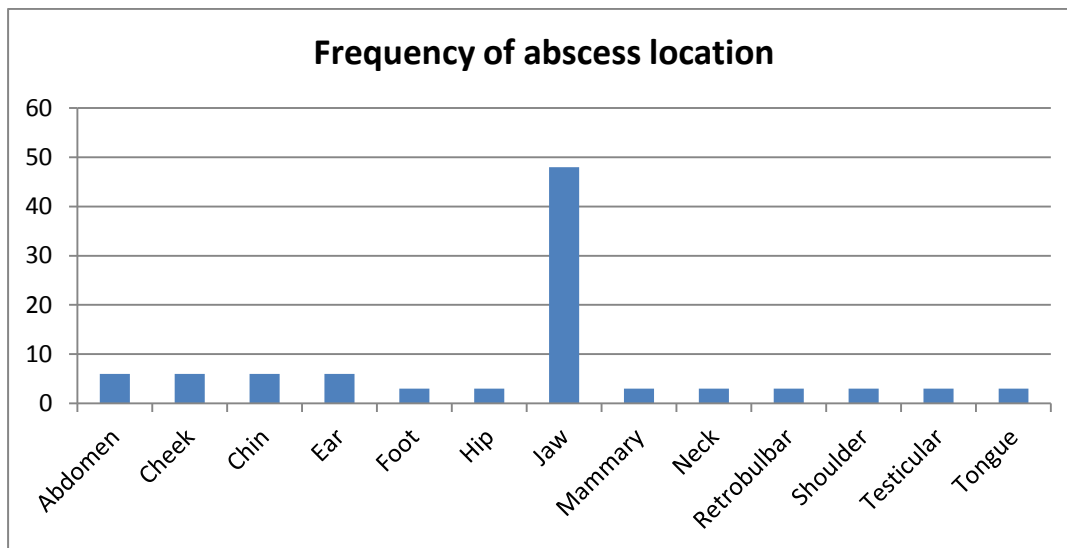
Of those rabbits reported to have had uterine adenocarcinoma, 83% survived after surgery. In the remaining 17% the cancer was inoperable and resulted in death. Sixty percent of the rabbits reported to have thymoma died as a result of the disease, and 40% survived. Those reported to have survived were treated with prednisone and radiation.

A rabbit reported to have spindle cell carcinoma in the mouth was treated with surgery and chemotherapy and survived for several months. The rabbit with an unknown malignant neoplasia of the spleen was treated with prednisolone but died within ten days of diagnosis. The rabbit reported to have mammary carcinoma recovered after surgery to remove the mammary glands. In the case of the rabbit with testicular cancer, it was stated that the veterinarian did not wish to operate because of the age of the rabbit (nine years), and the respondent chose to give the rabbit an herbal treatment which was reported to be successful in halting the progression of the disease.



## Abscesses

Abscesses were reported in 11% of the survey rabbits. The majority of these were jaw abscesses (48%). Other reported abscesses occurred in the abdomen (1), the cheek (2), chin not involving jaw (2), the ear (2), foot (1), hip (1), mammary (1), neck (1), retrobulbar (1), shoulder (1), testicular (1), and tongue (1). Treatment of the abscess was reported to have been successful in 74% percent of the cases. The most common treatment reported was surgical excision followed by a course of antibiotics.



## PARASITES

### Ear mites

Nine percent of survey rabbits were reported to have had ear mites.

### Fur mites

Fur mites were reported in 12% of the survey rabbits. The most commonly reported anti-parasitic agents used were Revolution (selamectin) and ivermectin. The mites were reported to have recurred after treatment in 15% of the rabbits. The mite was reported to have been identified in only two of the cases; in both these it was *Cheyletiella*.

### Intestinal coccidiosis

Three percent of the survey rabbits were reported to have had intestinal coccidiosis.

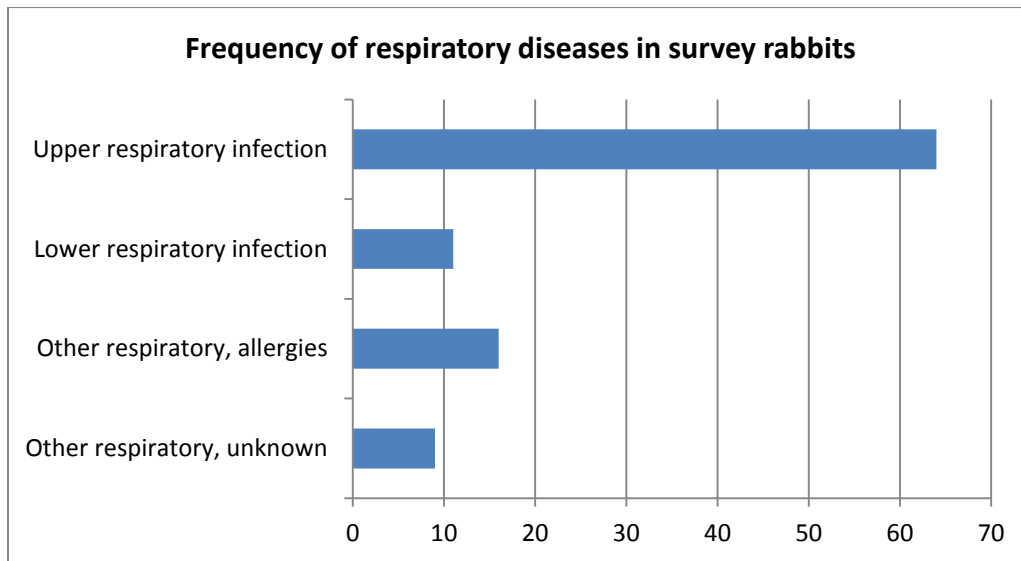
### Tapeworm and Pinworm

Four of the survey rabbits were reported to have had tapeworm. In all four the rabbit was allowed outside. In three of these cases the tapeworm genus was identified as *Cittotaenia*, in the remaining case the tapeworm was not identified. Two instances of pinworm were reported for survey rabbits.

### Flystrike

Three instances of flystrike were reported, one myiasis and two warbles (bot fly).

## RESPIRATORY DISEASE



### Upper respiratory infection (URI)

URIs were reported in 10% of survey rabbits. The causal organism was unidentified in most of the cases. In the two instances the genus was identified in one it was *Pasteurella* and in the other *Pseudomonas*. Recurrence of the URI was reported in seventeen percent of the rabbits.

### Lower respiratory infection (Pneumonia)

Five of the survey rabbits were reported to have had a lower respiratory infection. EC was given as the cause in two of the cases. The infection recurred in three of the rabbits.

### Other respiratory infection

Four of the eleven reports of other respiratory problem were stated to be from allergies, one was reported to have been most likely caused by a dental issue, and the remaining were unidentified.

### Myxomatosis

Both reported instances of myxomatosis occurred in the UK and were cases of atypical myxomatosis, where inoculated rabbits have benign fibromas form under the skin.

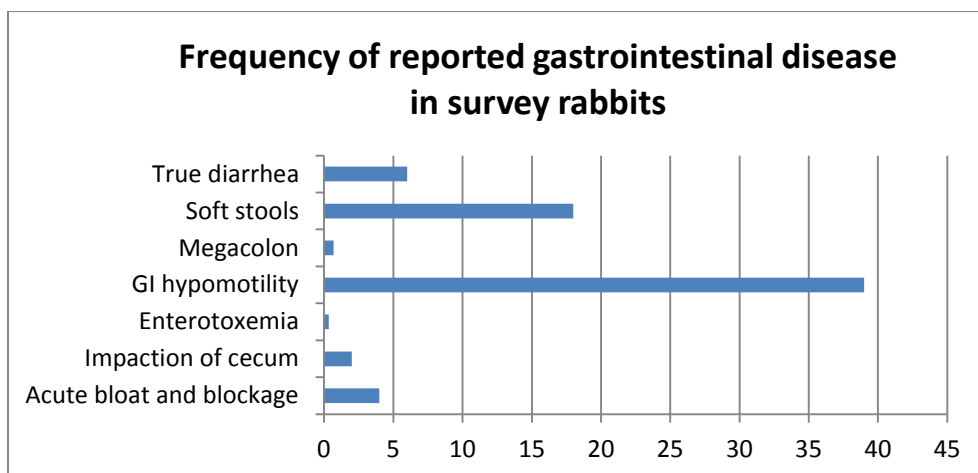
### Vent disease (rabbit syphilis/treponematosis)

Five of the survey rabbits were reported to have had treponematosis.

### Papilloma and Fibroma

Three instances of papillomas were reported (none oral), and no instances of Shope fibroma.

## GASTROINTESTINAL DISEASE



### Gastrointestinal hypomotility (ileus, stasis)

Gastrointestinal hypomotility was the most frequently reported disease in the survey rabbits, with 39% of respondents reporting one or more episodes. The signs of GI hypomotility have been publicized by various pet rabbit organizations, and it is one of the more well-known digestive ailments of rabbits. This may partially account for the high number of occurrences reported. Respondents were asked to list signs of the disease that were present, and in some cases the signs listed were more consistent with other intestinal disease. In four cases the signs listed were more typical of acute bloat and blockage: tympany, sudden onset, death within 24 hours or emergency surgery to remove blockage; and in two cases the listed signs were more consistent with other GI ailments. These six questionable instances were not included in the totals for statistical analysis.

The number of reported incidences of GI hypomotility (ranked) was compared to the inclusion/non-inclusion of eight dietary categories in the rabbits' diet (pellets, hay, greens, other vegetables, fruit, seeds/nuts, grains and treats) and analyzed. A statistically significant ( $p < 0.01$ ) relationship was found with the inclusion/non-inclusion of greens in rabbit diet and the number of reported incidences of GI hypomotility, with those rabbits not receiving greens in their diet having had significantly more episodes of GI hypomotility. Episodes of GI hypomotility were also analyzed with the occurrence/non-occurrence of other diseases and a statistically significant relationship ( $p < 0.001$ ) was found between the presence of points on cheek teeth and the number GI hypomotility episodes, those rabbits with points having significantly more episodes of GI hypomotility than those without cheek teeth points. A statistically significant relationship ( $p < 0.001$ ) was also found between the number of episodes of GI hypomotility and diarrhea; rabbits reported as having had diarrhea having more episodes of GI hypomotility.

Respondents were also asked to list any conditions that might have predisposed the rabbit to GI hypomotility. Respondents whose rabbits had suffered a single instance of GI hypomotility more frequently listed predisposing circumstances. Among those listed were stress, death of a bonded partner, surgery, change of routine, dental problems and ingestion of a foreign object.

### Acute bloat and blockage

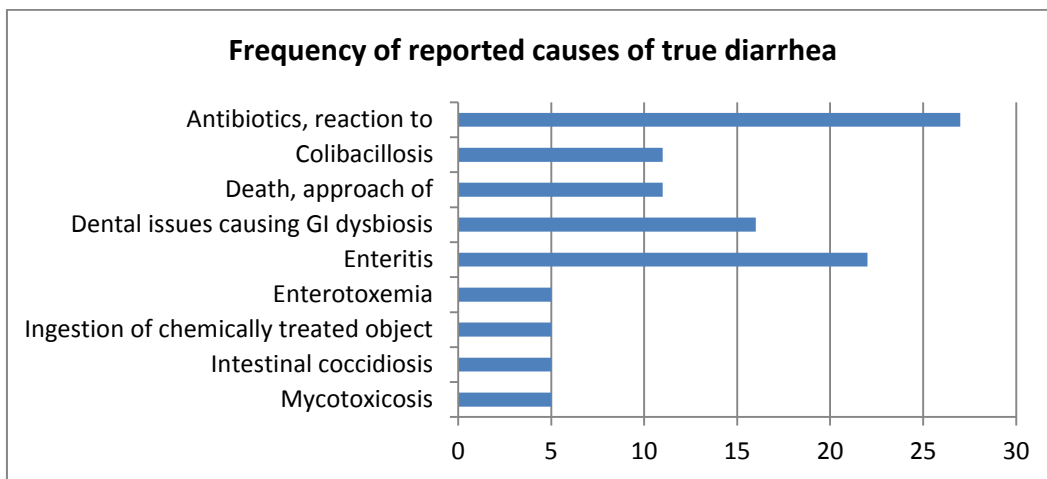
Four percent of the survey rabbits were reported to have had acute bloat and blockage, although the actual frequency may have been higher than reported (see previous entry on GI hypomotility). Almost half of those rabbits reported to have had acute bloat with blockage were reported to have died from it.

## Soft stools

Eighteen percent of survey rabbits were reported to have had soft stools. Respondents were asked to list any dietary items that appeared to cause soft stools. The food groups most often listed were greens, vegetables, fruit and pellets, in that order. Specific food items that were reported to cause soft stools if given to a survey rabbit in large amounts were bananas, carrots, kale, pumpkin, Romaine, Swiss chard, and fresh grass. No statistically significant relationships were found between the feeding of any particular item and the occurrence of soft stools.

## True diarrhea

True diarrhea was reported in 6% of survey rabbits. Among the causes listed for occurrences of true diarrhea were colibacillosis (*Escherichia coli*), intestinal coccidiosis, mycotoxigenesis, enteritis, reaction to antibiotics, and nearing death. Some respondents listed more than one cause. Rabbits reported to have had true diarrhea had significantly ( $p < 0.001$ ) more episodes of GI hypomotility than those rabbits that had not had true diarrhea.



## Other GI ailments

**Enterotoxemia** was reported in three survey rabbits, **mycotoxigenesis** in two, **cecal impaction** in six, **cecal dysbiosis** in one and **megacolon** in two. Both rabbits reported to have megacolon had spotted patterns in their fur.

## Urinary tract infection (UTI)

Ten percent of the survey rabbits were reported to have had a UTI. The infection recurred in one-third.

## Urolithiasis

Urolithiasis was reported in 6% of the survey rabbits. Stones were found in 39% of these; the remaining 61% had small crystals or “sludgy urine.” There were no statistically significant relationships found between occurrences of urolithiasis and the inclusion/non-inclusion of any dietary item.

## Renal failure

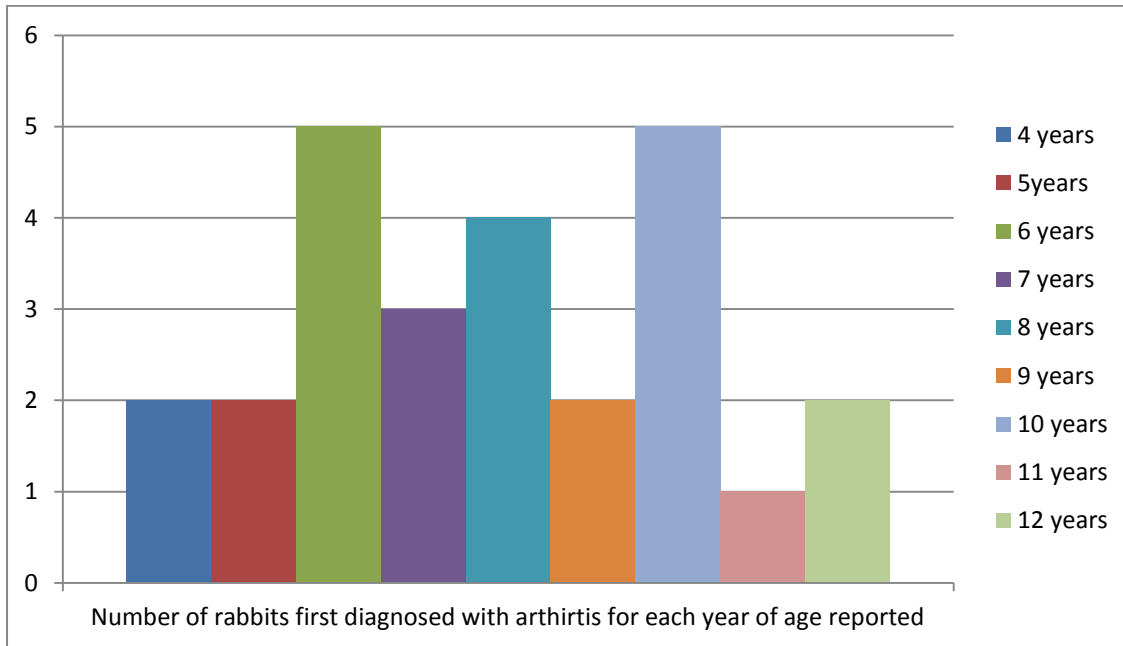
Thirteen of the survey rabbits were reported to have suffered renal failure. In six of these chronic renal failure was listed, six listed acute renal failure, and one rabbit was reported to have both chronic and acute renal failure.

## Diabetes

Diabetes was reported in one survey rabbit, a New Zealand White mix.

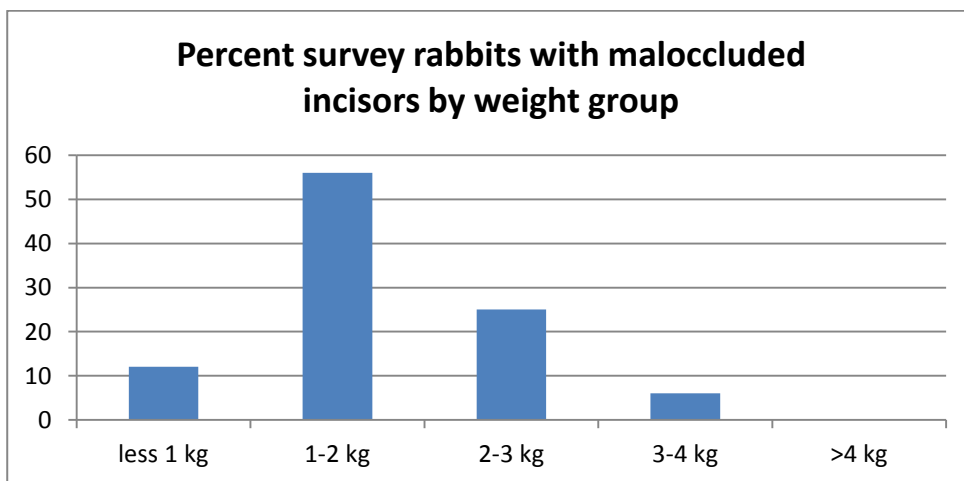
## Arthritis and spondylosis

Ten percent of the survey rabbits were reported to have arthritis and 2.5% to have spondylosis. Respondents were asked to list the age at which arthritis was first diagnosed in the rabbit, if known. All but two respondents supplied the age at which arthritis first appeared. The mean age at which arthritis was first diagnosed was 7.8 years.



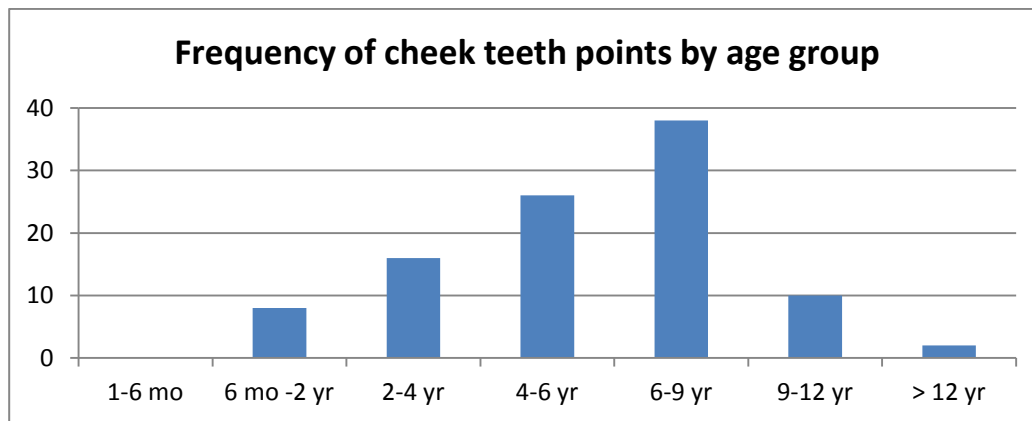
## Maloccluded incisors

Six percent of the survey rabbits had maloccluded incisors. There was a statistically significant ( $p < 0.001$ ) relationship between weight group and maloccluded incisors, with most of the rabbits having maloccluded incisors weighing between one and two kilograms (1 kg = approx. 2.2 lb).



## Points on cheek teeth

Seventeen percent of survey rabbits were reported to have had points on their cheek teeth. The occurrence of points on cheek teeth and the inclusion/non-inclusion of questionnaire dietary items were tested, but no statistically significant relationships were found. There was a statistically significant relationship ( $p < 0.001$ ) between the occurrence of points on cheek teeth and age of the rabbit, and between points on cheek teeth and the number of episodes of GI hypomotility ( $p < 0.001$ ).



Respondents were asked to give the age at which cheek teeth points first appeared, if known. Forty-one respondents listed the age at which the points first occurred. Both the mean and median age were four years.

## Sore hocks (ulcerative pododermatitis)

Sore hocks were reported in 12% of the survey rabbits. No statistically significant relationship was found between sore hocks and age group or weight group; the sample size was not large enough to test for a relationship between sore hocks and breed of rabbit.

Respondents were asked to state the type of flooring the rabbit had been kept on. Most of the reported flooring surfaces rabbits with sore hocks were kept on were hard and smooth. Several of the rabbits had been kept on soft flooring or soft coverings before the sore hocks occurred. Only two rabbits with sore hocks were reported to have been kept on wire flooring and two on flooring covered with aspen shavings. Many respondents reported adding pads, towels, and/or blankets to the rabbits' living space after sore hocks occurred. The one rabbit in which the sore hocks were reported to have progressed to bacterial infection was kept on a litter-covered surface.

Several of those rabbits reported to have sore hocks had mobility problems because of arthritis, spondylosis, having had a limb amputated or having lost mobility through injury and/or paralysis.

## Hyperthermia (heat stress)

Three survey rabbits were reported to have had hyperthermia. Two of these rabbits lived in a desert environment without air conditioning.

## Hypothermia

Seven percent of survey rabbits were reported to have had low body temperature; the majority in conjunction with episodes of gastrointestinal hypomotility (stasis).

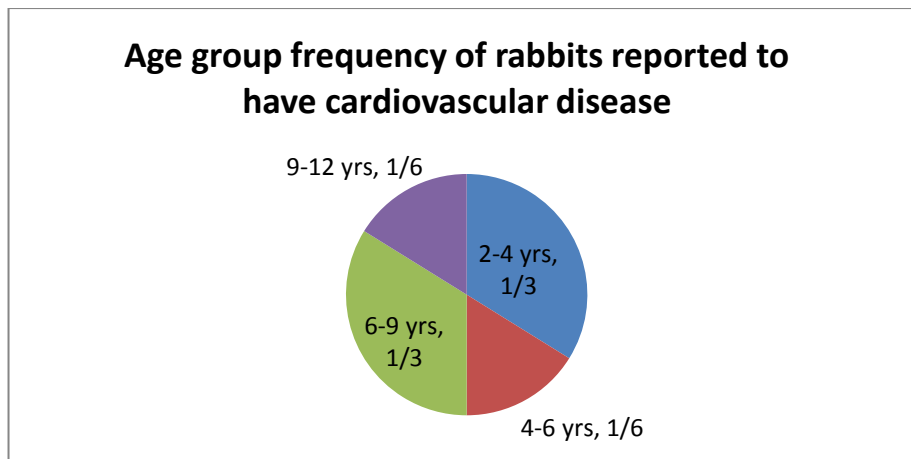
## CARDIOVASCULAR DISEASE

### Stroke

One rabbit in the survey was reported to have suffered a stroke.

### Cardiomyopathy and congestive heart failure

Six rabbits in the survey were reported to have heart disease; four of the diagnoses were presumptive and two definitive. One of the latter was a two-year-old rabbit diagnosed with an enlarged heart and a heart murmur. The rabbit was treated with Lasix (furosemide), and coenzyme Q10 (CoQ10) for one year. The heart remained enlarged but the murmur was not longer detectable, and the rabbit continued on CoQ10 alone. The other rabbit which received a definitive diagnosis was given enalapril; atenolol was added to the protocol when arrhythmia developed.

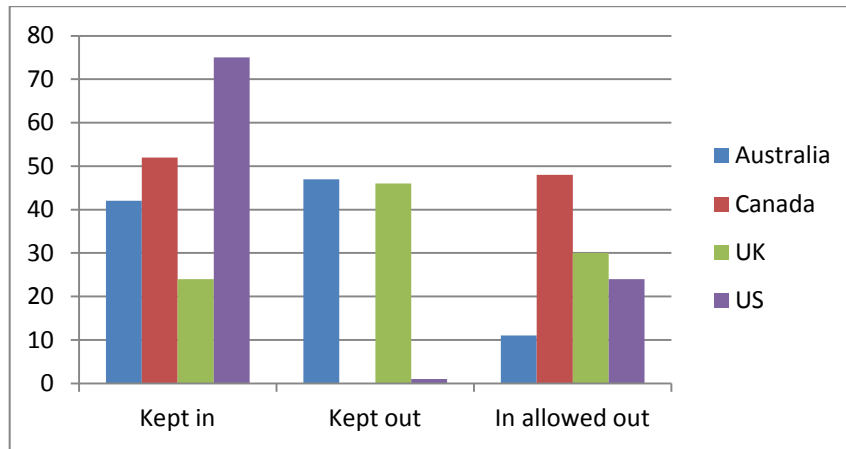


## REPORT POSTSCRIPT

When I began working on the Pet Rabbit Health Survey, my intention was to develop a tool for the collection of information on pet rabbit husbandry and disease and to identify significant relationships between diseases and also between diseases and husbandry practices. The sample size was smaller than I had hoped it would be, limiting the analyses I was able to do and therefore limiting the number of statistically significant relationships I found. But the international makeup of the sample gave me an unexpected bonus: there were enough survey respondents from the English-speaking countries of the US, UK, Canada and Australia that I was able to compare husbandry practices. I found some interesting statistically significant differences.

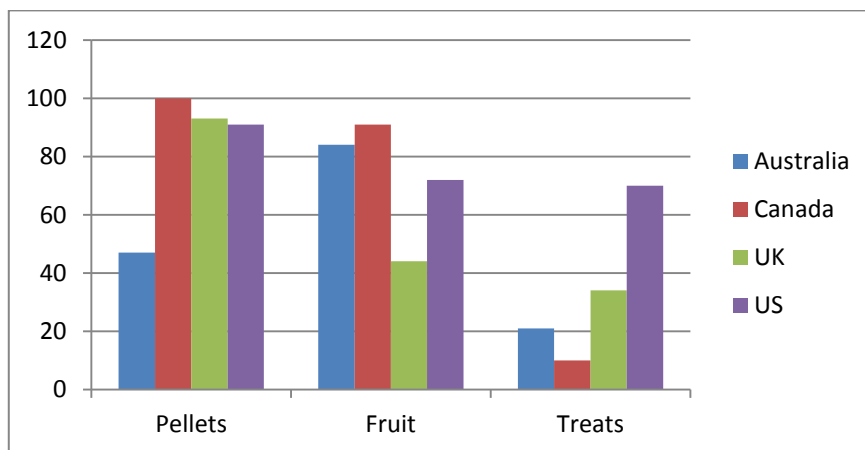
The first of these differences has to do with where the rabbit is kept – inside, outside, or inside allowed out. Respondents in the UK ( $p < 0.001$ ) and Australia ( $p < 0.01$ ) reported allowing their rabbits outside significantly more often than respondents in the US.





**Percent rabbits kept inside, outside or both by country**

I also found some statistically significant differences in what the rabbits were fed. Respondents in the US reported feeding rabbits significantly more fruit ( $p < 0.001$ ) and treats ( $p < 0.001$ ) than respondents in the UK, and respondents in the UK reported feeding significantly more pellets ( $p < 0.001$ ) than those in Australia. Canadian respondents fed significantly more fruit to their rabbits ( $p < 0.001$ ) than those in the UK; Australian respondents reported feeding significantly more fruit ( $p < 0.01$ ) than those in the UK, and respondents in the US fed significantly more pellets ( $p < 0.001$ ) and treats ( $p < 0.001$ ) to rabbits than respondents in Australia.



**Percent survey rabbits fed food items by country**

>END<