

A Survey of the Health Issues of Friesian Horses

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Abstract

The Friesian is a noble and historic breed of horse which has a devoted following of breed admirers who have cared for the breed through its long and troublesome past, including a period of near extinction during the early 20th century. In recent years, the Friesian horse community has seen a significant number of breeding stallions dying unexpectedly at a young age. In addition, anecdotal evidence seems to show that the Friesian breed as a whole may be suffering from unexpected and premature deaths. The purpose of this study is to create baseline data through a survey of Friesian owners to determine what ailments are most common within the breed and whether any of these ailments are more frequent within the Friesian horse population than the population of horses as a whole. An online survey was distributed to the members of the Friesian Horse Association of North America (FHANA), asking about the health histories of their horses, and results compared to a baseline study in horse health by the USDA. The survey results showed that Friesians are more prone to scratches and retained placentas than the overall horse population, and have a higher death rate. Colic also showed a higher than average result, but was statistically incomparable with the USDA results. It is hoped that this study may serve as a basis for further studies on Friesian health, specifically the occurrence of colic in Friesians and the possible reasons behind their higher death rate.

Introduction

[EDIT: The original copy of this paper contained a lengthy introduction to the Friesian horse breed and its history for the benefit of laymen not familiar with the Friesian. These pages have been edited out for this edition, on the basis that those reading this paper within the Friesian horse community are well versed in the breed's history and characteristics, and need not trouble themselves scrolling through eight pages of known information. I have left the introductory section on Friesian health, to provide some background on ailments discussed later, insight into the limitations of trying to obtain reliable information about ailments through a survey and perspective on the anecdotal evidence available at the start of my research. - K.S. Evans]

Horse Health

The Friesian horse has been noted to be predisposed to certain health issues, sometimes due to its general body or breed type, sometimes due to more specific causes. Colic, retained placenta, scratches, osteochondritis desiccans (OCD), locking stifles and dwarfism were ailments of particular note. It is important to note that with the exception of retained placentas and dwarfism, these ailments are noted due to anecdotal evidence indicating a certain prevalence in the breed have not been scientifically studied in the Friesian breed and as yet there is no conclusion that Friesians are more prone to these ailments than other breeds.

While colic is known within the horse industry as one of the most common of serious equine ailments, the term “colic” actually refers to the symptom of abdominal -usually intestinal-

pain. Colic symptoms may be attributed to a range of actual causes, from parasite infestations to overfeeding.

Tim Hawcroft's *A-Z of Horse Diseases and Health Problems* identifies five types of colic. Flatulent colic which is caused by the "formation of large volumes of gas mainly in the large intestines - due to excess feeding on lush green pasture, clover, and other legumes" (Hawcroft, 1990, p.177). Gastric dilation may be caused by the consumption of large volumes of low quality feed such as moldy hay or grain, coarse straw, maize, etc. causing gas build up and internal swelling. Impaction colic is essentially the constipation of the small and large intestines. This may be caused by a hurried consumption of low grade forage, which does not digest fully and forms into balls of undigested material, causing impaction. Spasmodic colic is caused due to the rapid contraction of muscles in the intestinal wall. Obstruction colic is often the most serious form, and may be caused by, "a foreign body - twisted bowel - strangulated intestine resulting from hernia - intussusception (telescoping of one section of bowel inside another section of bowel)" (Hawcroft, 1990, p.179).

According to Archer and Proudman, colic is the most common form of death in some horse populations. In this study, the authors reviewed the results of papers that identified risk factors for colic. The season of the year is a possible factor, with multiple studies finding a higher rate of colic cases in the spring, although according to Archer, "It is important to consider that seasonal incidence of colic may not be associated with weather factors alone but other potentially alterable management factors common to that time of the year such as stabling, quantities of feed or exercise levels" (Hillyer et al., 2001 and Archer et al., 2004). The presence of parasites in the gut is a well-known cause of colic. In recent years however, incidences of parasite-caused colics

are largely reduced due to the availability and frequent use of anthelmintic drugs (Archer & Proudman, 2006).

Causes such as geography and intrinsic traits of an individual horse, such as cribbing, wind-sucking or a previous history of colic are likely a contributing factor to the onset of colic but are inherently difficult to measure due to the large number of variables. Unfortunately, this is often the case and narrowing down susceptibility to gender, age and breed are similarly difficult. Numerous studies have shown the breeds of Thoroughbreds and Arabians to be at increased risk for colic. Again, Archer mentions that other factors are possibly involved, including the management practices of certain breeds and the fact that there may be a bias in the breeds brought to veterinary clinics. Also, certain breeds may be more susceptible only to certain types of colics, such as large Warmbloods to dorsal colon displacement. According to Archer, genetic predisposition to colic is possible in some cases: “Enterolithiasis is particularly prevalent in certain breeds such as Arab horses and Morgans making a genetic predisposition to the disease possible” (Cohen et al., 2000 and Hassle, 2004).

In the realm of management, another commonly known cause of colic symptoms is related to types of feed and feeding practices. Quality, freshness, and regularity of feed and changes in any of these factors, either roughage or grain, may be factors in the contraction of colic. “These studies demonstrate that change in feeding practices is significantly associated with increased risk of colic, supporting historical belief that change to new types or amounts of feed should be gradual” (Archer & Proudman, 2006). However, stabled horses may be under better observation and more likely to be diagnosed with colic. Changes in living situations, transportation, certain vaccinations, and strenuous exercise may heighten the risk of colic.

Archer's study demonstrated that a wide range of factors are present when evaluating the risk for colic ailments in individual horses, making an accurate diagnosis of the cause difficult. Most studies identify management practices as a major factor in managing the risk of colic. Overall, abrupt changes in the diet and routine of a horse have shown to increase their chances of contracting a case of colic. It is difficult to determine whether certain breeds of horses may be genetically predisposed to particular types of colic, but it is suggested through both Archer's and Cohen's studies of, separately, Thoroughbreds, Arabs, Morgans and Warmbloods, that this may be so.

Scratches, or pastern dermatitis, is known anecdotally as a common minor condition in the Friesian breed and other horses with pronounced fetlock hair or "feathers." It is a skin irritation, usually found on the feathered lower legs, beneath the pastern and fetlock and sometimes running up the cannon bone and behind the knee. According to Akucewich, author of "Equine Pastern Dermatitis," feathers are the predisposing factor of scratches, though the causes may vary. Environment and management may have a significant contribution to the onset of scratches. Factors include a wet climate, poor pasture hygiene, alkaline soil, sand, poor grooming habits, and irritating topical products. Severity can range from mild, with dry skin and scabs, to severe, with swelling of the entire leg, oozing scabs and open sores. The cause of scratches may vary, from allergies to a mite infestation or fungal growth due to moist, dirty conditions in the fetlock hair.

The possibility of a retained placenta is a worrisome aspect of foaling for any mare owner. A retained placenta is the delayed expulsion of the fetal membranes after a mare has given birth. If the complete placenta is not expelled within three hours of birth, the mare may begin absorb-

ing toxins and bacteria from the uterus (Thomas, 2009). If left untreated, a full or partially retained placenta can cause an infection, which may result in “toxic metritis (inflammation of the uterus), followed by laminitis” (Sellnow, 2002). A study by Sevinga found that Friesian mares were more likely to have a high incidence of retained placentas than other breeds of horses. In a follow up study, “Effect of inbreeding on the incidence of retained placenta in Friesian horses,” Sevinga’s results indicated that Friesians may be more prone to retained placentas due to their relatively high inbreeding rate.

Osteochondritis Dissecans, or OCD, is a degenerative joint disease often found in young, rapidly growing horses who will mature to a large size (over 15 hands). Symptoms include lameness or swelling in the fetlocks, hocks, or stifles and is caused by the break down of cartilage in the joints, which harden into partially attached or free-floating bone cysts which may irritate the joint (Byron, 2008). This is usually brought on by increased activity in young growing horses and is not uncommon in the early training of larger horses. Similarly locking stifles, or the upward fixation of the patella, is often a short term problem for the joints of young growing horses, and in some cases may be caused by OCD.

Dwarfism is an extreme form of abnormal development, affecting in particular the growth of the legs and ribs (Beck, 2008). While relatively rare in horses, congenital dwarfism has been recognized within the Friesian breed for many years. According to research done by the Australian Friesian Warmblood Association, reports from early 20th century Holland make note of certain stallions producing a large proportion of “midget foals.” At the time these vet reports were made, numbers of dwarf foals born to Friesian mares were significantly higher than they are to-

day, indicating that the changes in breeding selection suggested in the report were at least partially successful in reducing the incidence of dwarfism within the breed.

Methodology:

In considering a method of collecting data on Friesian health, it became clear that the quickest and most efficient way to collect information from Friesian owners (a relatively small population spread across the country) was through an online medium. An online survey was designed through SurveyGizmo.com to collect first hand accounts about Friesian health from owners of registered Friesian horses across North America. The survey was directly distributed via email to approximately 2000 members of the Friesian Horse Association of North America. Accompanying the survey was information notifying participants of the nature of the study and the use to which their data would be put. All participants had the option of choosing the level of confidentiality of their information, ranging from complete anonymity, to complete disclosure of details in any final written report.

Information was collected on many variables in the horse's care and condition so that in the future it will be possible to determine trends or connections between ailments and the horse's lifestyle, besides the commonality of breed. General horse information such as age, height, weight and bloodlines were asked for, as well as details about management techniques (amount of hay, grain, water, shelter, exercise), and of course, the health history and past ailments of the horse.

A test version was sent out to the readers of a Friesian e-mail forum, who were asked to provide feedback on its usefulness and design. After appropriate changes had been made, distribution of the surveys began via systematic e-mail of the members of the Friesian Horse Association of North America.

In the management section, the questions were well framed and information lent itself to easy collection by the survey program and was turned quickly into graph-able data. Unfortunately, management was only a secondary and relatively unimportant aspect for the purposes of this particular project. The most relevant information was the recorded health issues of each horse. Due the large scope of potential health problems, the health section of the survey was left in open-ended paragraph form, for owners to fill out the health histories of their horses. This later proved to make up the bulk of the work hours spent on the project. While there was a section for the owner to simply list their horse's ailments, this section was underutilized, and proved largely ineffective. An owner may have left the list of ailments blank, believing their horse had not experienced any health problem significant enough to warrant listing, while in the paragraph-form health history section, they contradicted themselves, referring to numerous ailments their horse had experienced in their lifetime. Therefore, the ailment listings were largely disregarded, and the health histories used as a primary source of categorizing ailments. As a result, the 200 survey responses needed to be read and categorized by hand. This process allowed for an effective, if trial-by-fire learning experience in the methods and reasoning behind survey design and subsequent statistical analysis.

In regards to classifying horses as healthy or not-healthy, respondents often reported that their horses were "the picture of health" then would go on to describe minor ailments such as scratches or previous joint problems that their horse suffered from. Only entries which stated their horses were healthy (or a synonymous term/phrase) without any listed exceptions, were coded into the healthy category. Otherwise, the ailments mentioned would take precedence, since for the purposes of this study, the horse could not be both healthy and have a known ailment.

In regards to those recorded as having one or more ailments, no one ailment was prioritized over another. So for instance, if one horse suffered from both colic and scratches, both of these incidences were included in the end total of health problems. As a result, the number of incidences of health problems (287) is higher than the number of total survey responses (200).

I had originally planned to use an identical survey upon the general horse population to provide a comparison for my results. Unfortunately, effective distribution of the general horse survey proved to be problematic and it was necessary to find another source for data to compare to my results of Friesian health. A comparable study was found in a USDA report, "Equine 2005: Baseline reference of Equine Health and Management." This study served as a control and provided the information necessary for an effective evaluation of my results in the Friesian horse.

Results

Out of 200 owner responses to the Friesian survey, representing 200 individual horses, there were 287 total health descriptions.¹

Table 1 - Occurrences of health descriptions in Friesians

	# of incidences	# of horses	# fatal
Circulatory	6	6	3
Respiratory	7	6	1
Infection	11	10	0
Gastro Intestinal	39	31	4
Disease	13	12	0
Reproductive	18	16	0
Skin	38	32	0
Lameness	35	31	0
Other	51	43	1
Healthy	69	69	0

In below comparisons of Friesian specific results and USDA general horse population results, the USDA's reported sample size is N = 4000, the Friesian survey sample size is N=200. Confidence intervals shown are at 95%.

¹ After analyzing the health responses, it was determined that although a large portion (more than 33%) of responses described the horse as healthy, but only 69 responded only with "healthy" and did not add on descriptions of minor ailments. The remaining responses which listed both "healthy" and described some health issue, were categorized under that health issue. Ex: "Healthy except for an abscessed hoof a few months ago"

Figures 1 & 2 - Fatalities

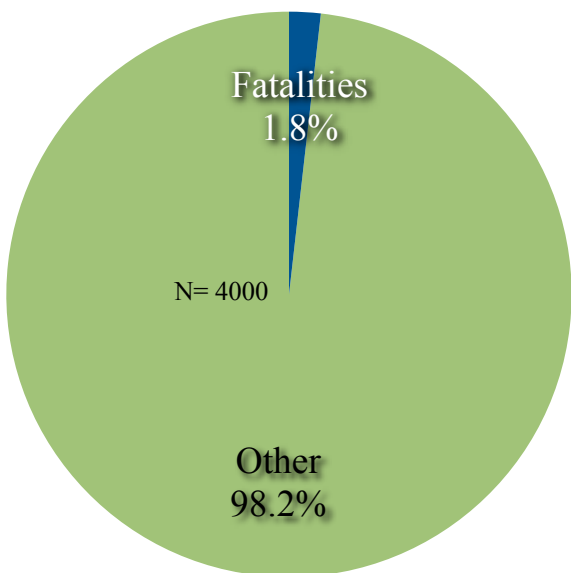


Figure 1 - USDA

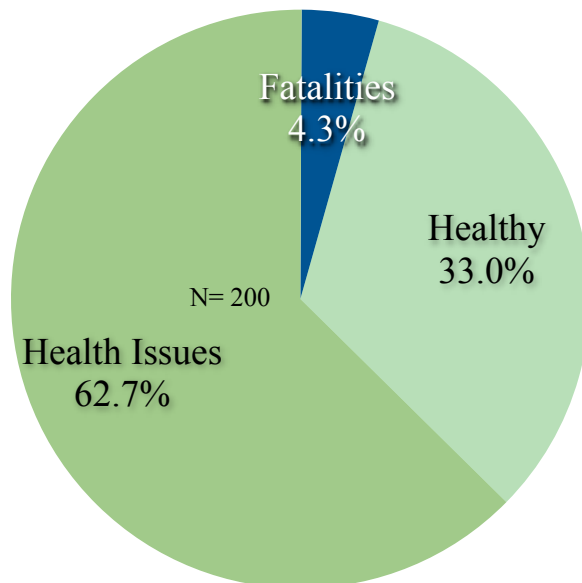
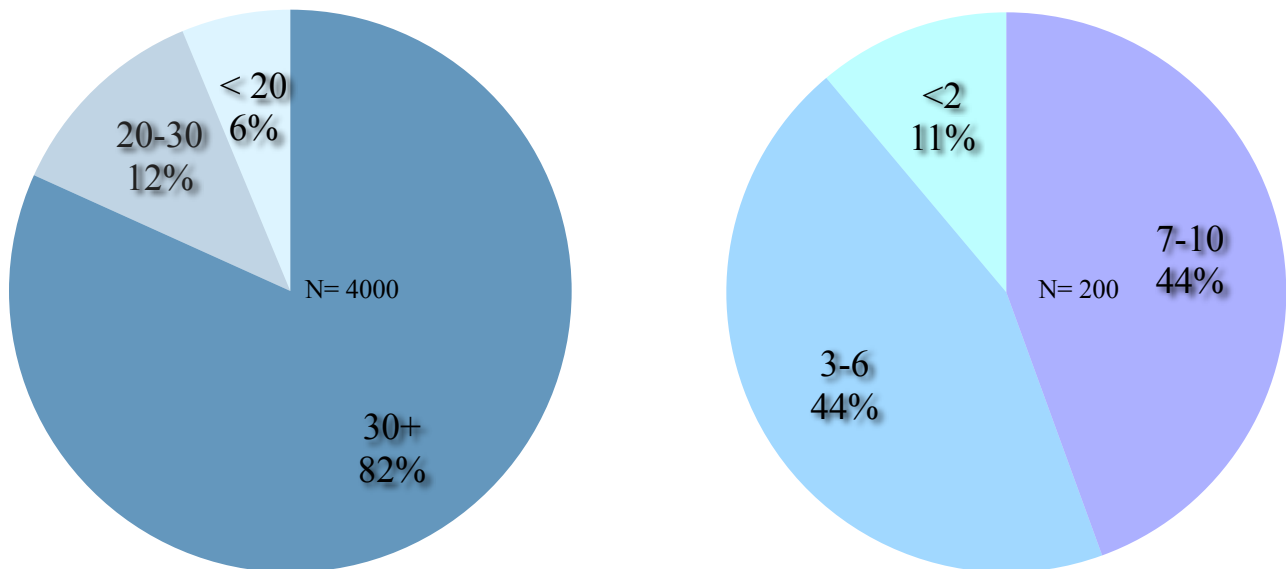


Figure 2 - Friesians

Above is a comparison of the USDA and Friesian results in regards to total fatalities. The USDA reported that 1.8% of owners reported that they owned a horse over the age of 30 days who had died within the previous twelve months (Fig. 1). The Friesian population shows nearly twice the percentage of fatalities, with 4.3% of owners reporting fatalities of horses over the age of 30 days (Fig. 2). The USDA did perform a breakdown of respondents into those that were considered healthy and those that were showing ailments. The Friesian survey showed that 33% of respondents owned horses they described as completely healthy with no known health problems.

Figures 3 & 4 - Ages of Horses at Death (in years)



Above is a breakdown of the ages at death of the total number of fatalities shown within the USDA and Friesian studies. In the USDA study (Fig. 3), the majority (82%) of total fatalities were of horses aged 30 years or older, followed by 20-30 years (12%) and less than 20 years (6%). In the Friesian population (Fig. 4), the majority of total fatalities were of horses aged 3-6 years (44%) and 7-10 years (44%), with the remaining dying under the age of 2 years (11%).

Figure 5 - Comparison of colic frequency

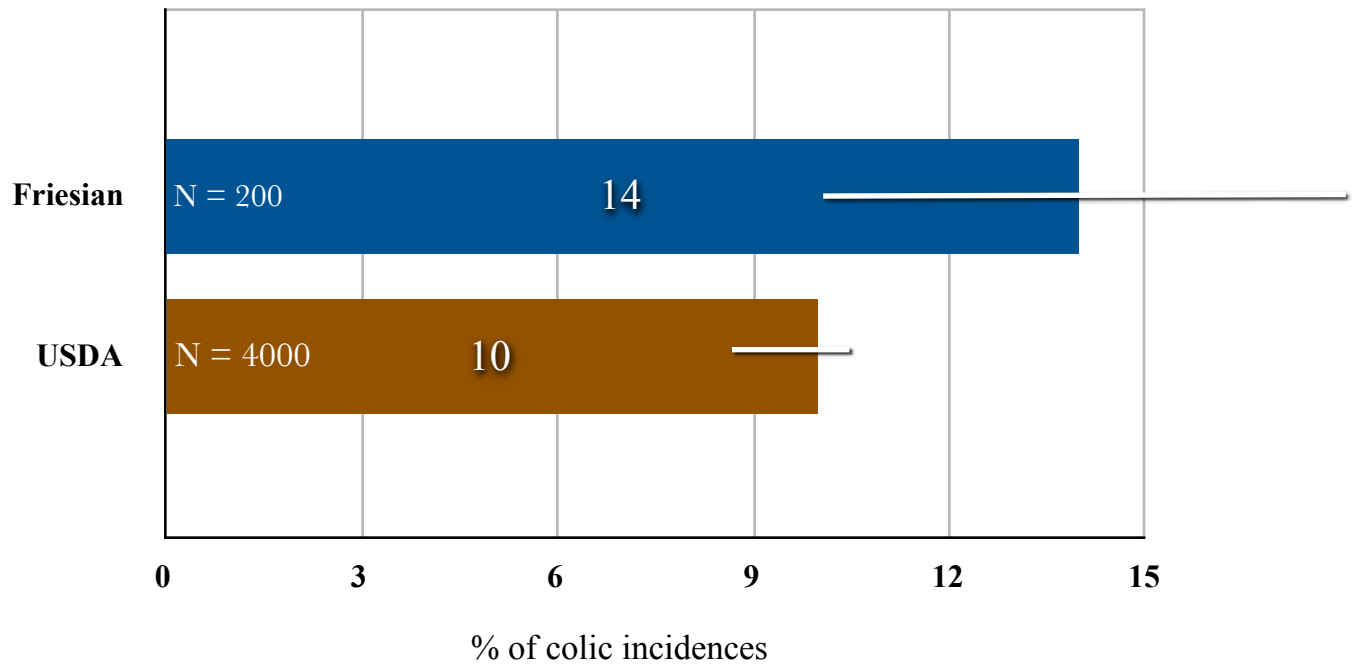


Table 2 - Comparison of Colic frequency

	Amount	Percent (%)	Confidence Interval (%)
Friesian (N=200)	28	14	4.81
USDA (N=4000)	400	10	0.93

Figure 5 and Table 2 show a comparison of the colic frequency in the Friesian horse population and the USDA general horse population. The line shown represents the confidence interval at 95%. The performance of a Z-test for Proportions² determined that the two groups do not have a significant enough difference for statistical comparison.

² Confidence intervals shown were determined using Dimension Research, Inc.’s “Confidence Interval for Proportion calculator” and “Z-test for Proportions calculator”, which can be found here: <http://dimensionresearch.com/resources/calculators.html>

Figure 6 - Comparison of reproductive ailment frequency

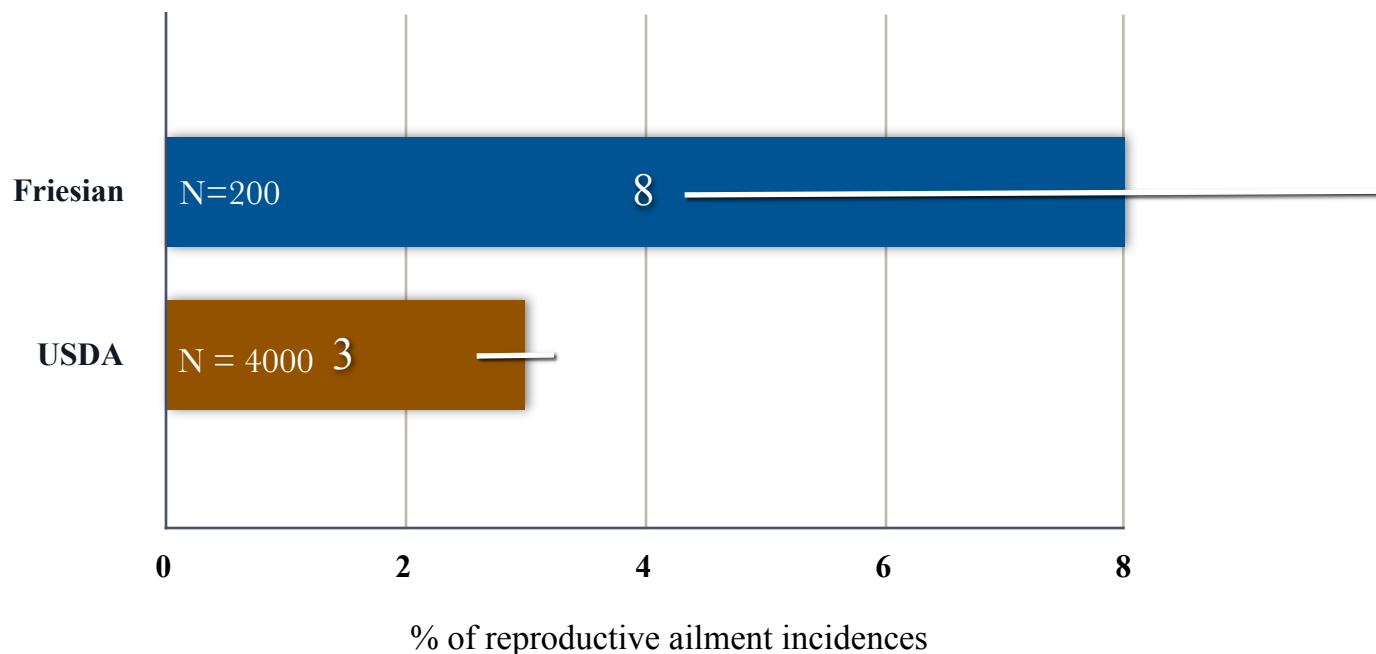


Table 3 - Comparison of reproductive ailment frequency

	Amount	Percent (%)	Confidence Interval (%)
Friesian (N=200)	16	8	3.76
USDA (N=4000)	120	3	0.53

Figure 6 and Table 3 show a comparison in the frequency of reproductive ailments in Friesians and the USDA population. The Friesian population shows more than twice (8%) the number of reproductive problems than the USDA report (3%). Below, Figure 7 shows the breakdown of reproductive ailments within the Friesian population. Retained placentas account for nearly half (49%) followed by abortion (29%) and difficulties with conception (22%).

Figure 7 - Percent of retained placenta and other ailments reported within the % of Friesians with reproductive problems.

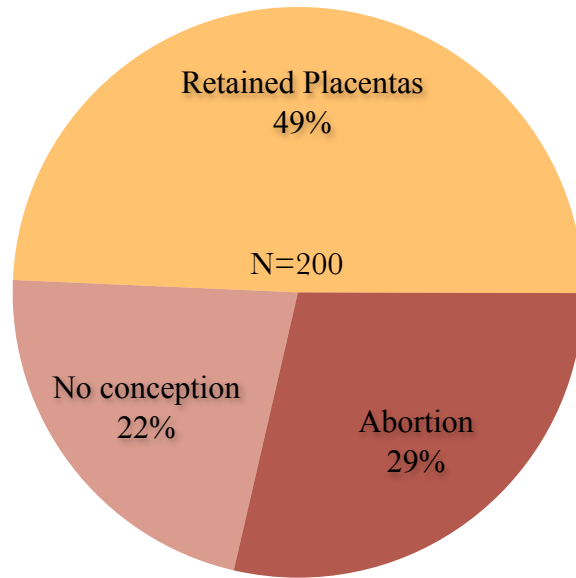


Figure 8 - Comparison of skin ailment frequency

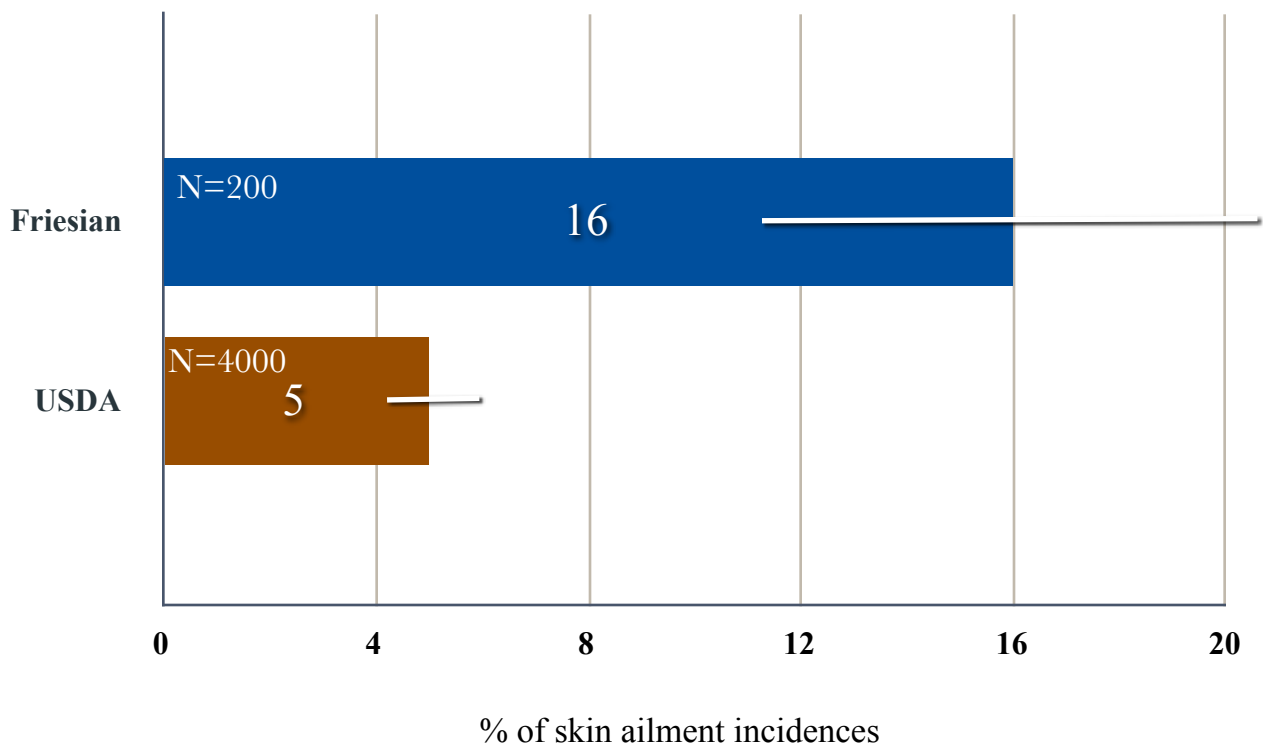
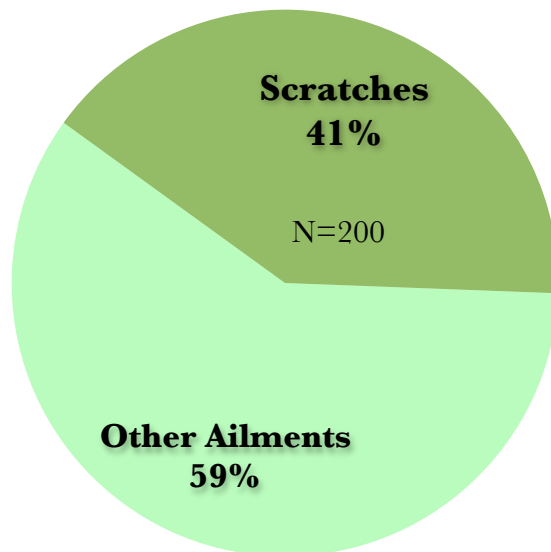


Table 4 - Comparison of skin ailment frequency

	Amount	Percent (%)	Confidence Interval (%)
Friesian (N=200)	32	16	5.08
USDA (N=4000)	200	5	0.68

The data compared for occurrence of skin issues showed the largest difference between the two groups. The USDA reported 5% of the sample population experienced skin problems, while 16% of the Friesian population reported skin problems. Of the skin problems reported in Friesians, 41% were scratches (Fig.9).

Figure 9 - Percent of Scratches and other ailments reported in Friesian skin problems.



Discussion

After looking through all of the results, ten categories of ailments became apparent; healthy, gastrointestinal, reproductive, skin, lameness, disease, circulatory, respiratory, infection, and other. Most of these categories became obvious upon review of the responses and what the most common ailments were. In the case of circulatory problems, the total number was fairly small, but it was given its own category due to an original hypothesis of frequency of heart issues in the breed, so that further comparisons could be made.

At the beginning of this research project it was hypothesized that certain ailments (indicated through anecdotal information from the Friesian owner community) would be found to occur more frequently in Friesians and that members of the breed were dying at a younger age than the average horse population.

Figures 1-4 show the percent of fatalities and the age at death of the Friesian and USDA groups. The Friesian group shows twice the amount of total fatalities in the sample population than the control group (Figures 1 and 2). The results shown in Figures 3 and 4 also show that in comparison to the general horse population, Friesians were more likely to die at a younger age, ages 3-10 years showed the most deaths, in contrast to the USDA's 20+ years. The results of this study confirmed the hypothesis the Friesians are dying at a higher rate and at a younger age than the general horse population.

In regards to frequency of ailments, the findings of this research suggest that the Friesian is in fact more prone to skin and reproductive conditions than the general horse population.

Skin issues, particularly the fungal infection known as “scratches” have anecdotally always been known to be a problem in the Friesian horse, due to the abundant “feathering” or hair on the lower legs. The frequency of scratches was confirmed in this study, which found that Friesians were significantly more likely to have skin issues than the general horse population (see Figures 8 and 9). Different management techniques have been practiced to attempt to reduce and prevent the occurrence of scratches. Some techniques for prevention include completely shaving the feathers or trimming the underside of the pastern joint, washing the feathers regularly, and keeping them free of dirt and moisture. Some topical treatments have been known to be effective on existing scratches, although they are unreliable.

Reproduction is one of the few areas where research has been done upon issues specifically related to Friesian horses. My survey supported known studies by Sevinga, showing that Friesian mares are more prone to reproductive issues, and retained placentas in particular (see Figures 6 and 7). Awareness within the community would be the most effective prevention of complications from a retained placenta. Owners are encouraged to call a vet for treatment if after three hours after birth, the entire placenta has not been passed.

Colic was a topic of particular concern due to the high risk of death associated with the ailment, and was expected to be higher than average in Friesians. While the results did show a larger proportion of Friesians experiencing colic than the USDA report, it was not found that the increased proportion was large enough to be statistically relevant in this study (Figure 5). Since colic is a dangerous condition, it may be worthwhile to do further studies to form a basis for comparison with the USDA, and to determine whether colic is indeed more common within the Friesian breed or perhaps may be caused by particular management styles.

Validity

It is most important that the reader be aware that the results of this study are not conclusive, but merely the first step in an attempt to identify the health status of the Friesian breed. The basis of this survey has relied upon owner statements, which while informative, are by nature unreliable in a statistical analysis. In many cases, the nature of a horse's problems are interpreted by the owner without diagnosis by a veterinarian, and even if a vet has been consulted, most diagnoses would not be conclusive without extensive and expensive testing or necropsy.

In regards to results concerning the average age at death of Friesians, the number of deceased Friesians out of the total sample size is relatively small and statistical results may be unreliable.

Conclusion

This survey was only the first step in creating a comprehensive picture of the health of the Friesian horse. During the course of this research, Friesian owners have shown the utmost concern and dedication to the idea of identifying and improving the health of their horses. Not only do individuals wish to protect the health of the horses they own, but also the future of the breed itself. The Friesian horse is an ancient, versatile and unique member of the equine family, easily identified by their distinctive black color, proud carriage, luxuriant mane and tail and easy temperament. Deliberate care has been taken over the years to ensure the successful continuation and quality of this breed, and though their population size has increased, vigilance is still necessary to ensure that the Friesian horse so many have come to love will continue to thrive. The research proposed here will ultimately attempt to aid in that preservation, and if successful, may result in a methodology of health review which can be used for other recovering breeds.

This report, while confirming anecdotal evidence put forth by Friesian owners, also raises many questions about Friesian health. Is colic in fact more prevalent within the breed as the results seemed to suggest? Why does the breed appear to have such a significantly shorter life-span than the average horse? What are the causes of these health issues, and if causes are due to management, are they preventable? Is there a genetic link to some of the health issues discovered? And most importantly, if any of these ailments are preventable, how may they be prevented in the Friesian population as a whole?

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Appendix I - Sample of the Online Friesian Health Survey**Friesian Health Survey**

Thank you for participating. Your personal information is not required for the completion of this survey, however if you wish to submit your contact information to allow for follow up interviews about your horse's health issues, there is an optional contact form at the end of the survey.

At this time, only horses with an FPS registration number can be processed. This is to ensure accuracy and to help combat false entries by allowing verification of a horse's identity.

* = required for submittal

1. FPS Registration Number: *

(This information is required in order to ensure that we do not receive duplicate entries for the same horse.)

2. Lineage *

Sire :

Dam :

Dam's Sire :

3. Age *

< 2 years

12-16 years

3-6 years

17-20 years

7-11 years

> 20 years

4. Sex *

Mare

Gelding

Stallion

5. Height

Under 14 hands

16 to 16.3 hands

14 to 14.3 hands

17 to 17.3 hands

15 to 15.3 hands

Over 18 hands

6. Weight

Under 950 lbs

1000 to 1500 lbs

950 to 999 lbs

Over 1500 lbs

7. Please give a brief health history of your horse. *

*Include any details you believe to be relevant, for instance, information you might give a vet.
(Ex: Age at onset. Basic timetable of ailment progression. Types of treatment/vet visits. Contributing factors...etc.)*

8. Please fill out this table of your horse's ailment(s). *In boxes that ask a question, please type only 'Yes' or 'No'. In the case that your horse had more than three ailments, please enter the three that you consider to be the most persistent and harmful to your horse's health.*

Ailment Name	Chronic?	Fatal?	Vet Treatment?

9. How often do you feed hay? *

- I don't feed hay.*
- 1-2 times daily*
- 3-4 times daily*
- > 4 times daily*
- Free choice/always.*

10. How much hay do you feed per serving? *

- I don't feed hay.*
- 1-3 flakes*
- 3-6 flakes*
- > 6 flakes*
- Free choice.*

11. What type of grain do you feed? *

- Pelleted*
- Sweet*
- Whole grains (oats, corn, etc)*
- Other*
- I don't feed grain.*

12. Please take this space to elaborate on your hay and grain choices. *Feed brands, hay type, nutrient content, feedings per day, quantity per feeding, etc.*

13. What is your horse's access to fresh water? *

Constant

Access a few times a day

Once a day

14. How often do you deworm your horse? *

15. What are your stabling conditions? *

Pasture with no shelter.

Stabling only.

Pasture with run-in shed.

Other

Stabling and scheduled pasture time.

16. How frequently does your horse have access to your pasture? *

17. What type of pasture does your horse have access to? * Please select all that apply.

Dry dirt

Sand

Lush pasture

Steep/rocky

Forest/woodland

None

Moist/muddy

Shrubby pasture

18. How often is your horse worked per week?

19. Rating low to high from 1 to 5, what do you consider the exercise level of a typical workout for your horse?

1

2

3

4

5

Light pleasure

Heavy training

20. Do you have any additional comments? Please share them here.

Appendix II

Sample of Open Text responses to Question 7: "Please give a brief health history of your horse."

1. Recurrent Lyme Disease (treated 7 times over 9 years). Symptom is a reluctance to work, which has sometimes increased to the point where she will barely trot and will refuse to canter. This is a horse who has shown First Level very successfully and has currently progressed to 2nd and 3rd level work in training. ELISA titer levels have ranged from 1280 (low positive) when she is feeling good to 20480 when she is symptomatic. Have treated with a variety of dosages of oral doxycycline (most recently for a 3-month course), oral tetracycline, and IV tetracycline (once we did a 28-day course and another we did a 10-day course; each was followed by 3 weeks of oral doxy). Chronic fungal infections of pasterns which she had when I got her (at age 3) and which continued and worsened at times (going up leg) until she got stovepipe leg (gross swelling of entire left hind leg). At that point I shaved her fetlocks and have shaved them every 3 – 4 weeks for a year and a half. No more problems! All the creams, shampoos, medications, etc I tried over the years were useless. She always had lumps on the back of her pasterns - these have now reduced considerably in size.

2. Very healthy. Receives regular vaccinations for Flu and West Nile Virus. I do not vaccinate for rabies, or strangles. She gets yearly dental checks and floats. I do not shoe, except for Keuring. She is otherwise always barefoot. Has feet trimmed about every 8-10 weeks. She had a very normal, uneventful pregnancy, and very easy foaling. Had more than enough milk. A very easy keeper.

3. Mare has had Two foals. Mild colic symptoms for several years, more in the past 6 months, after last foal birth, several times requiring vet intervention. Assumed gas. Last fatal episode July 2009, farm vet intervention with administered fluids and stomache draining, not successful, sent mare for surgery, to discover bowel seperation from mesintary tissue, believed to had occurred while rolling with pain earlier that day. Possible historical episodes were not gas colic, but when gut was full, there was something going on that caused the pain.