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Evaluation of Serum levels of Thyroid Hormones and Cortisol in Arabian Horses with Gastric Ulcer

Hamidreza Alipour Kheirkhah¹ and Ali Hassanpour^{2*}

¹Graduate of Veterinary Medicine, faculty of veterinary medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran

²Department of clinical science, faculty of veterinary medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran

ABSTRACT

This study was conducted to compare the serumic values of Thyroid hormones and cortisol in Arabian horses with and without gastric ulcers. Endoscopy was performed on 24 Arabian horses in Tabriz area, so 62.5% of Arabian horses suffered from gastric ulcers. In 73.33% ulcer was in non glandular part and 26.67% was in glandular part. There were not statically significant relevance between gastric ulcer and sex. Average serumic values of Thyroid hormones (T3, T4) and cortisol concentration in Arabian horses with gastric ulcer were more than Arabian horses without gastric ulcer. Serumic value of T3 hormone in Arabian horses with gastric ulcer was 116.61 ± 3.81 ng/dl and in Arabian horses without gastric ulcer was 98.54 ± 4.25 ng/dl and T4 was 2.2 ± 0.39 and 2.2 ± 0.33 µg/dl and cortisol was 2.43 ± 0.51 and 2.27 ± 0.8 µg/dl. There was a correlation in the differences of T3 ($P < 0.05$) but in there was not significant correlation in T4 and cortisol. The final result was that the serumic values of Thyroid hormones and cortisol concentration increased in Arabian horses with gastric ulcer.

Keywords: Arabian horses, Gastric ulcer, Thyroid hormones, Cortisol

INTRODUCTION

Gastric ulcer syndrome is with symptoms of anorexia, discomfort, abnormal movements of intestine leading to constipation or diarrhea and sometimes stomach bleeding and melena in focal [1, 2]. In many cases, this disease occurs sub clinically, which reduces the ability of the horse, especially in racing horse [3, 4] that is followed by the concerns of the owner. Ulcers represent a diverse clinical finding that has various productive factors [5].

Endoscopy of the stomach is very helpful in diagnosis [3]. Biochemical and hematological changes may result in gastric ulcers in horses. There could be changes in serum levels of certain hormones in horses with gastric ulcers. Within this research results and the high costs and problems of endoscopy, measurement of cortisol and thyroid hormones can have confidence in gastric ulcer diagnosis and make effective treatment strategies to reduce ulcer.

MATERIALS AND METHODS

This study was conducted on Arabian horse in Tabriz area's equestrians. 24 horses went under endoscopic examination. By prior arrangement with the equestrians horses fast for 12 to 16 hours. All information about the activities and history of previous illness in the past 2-3 months, clinical signs of disease, current anti-parasite schedule, history and duration of NSAID therapy in the past two months, the ability of horse in training, horse sex and the environment condition were recorded. Age was determined from teeth and was recorded. The mean age of the study of the Arab horse was 5-14. None of the horses which were in this study had no clinical symptoms related

to gastric ulcers. Before any manipulation blood samples taken from the jugular vein and transferred to the laboratory for measuring serum levels of thyroid hormones and cortisol.

Endoscopy

After obtaining blood samples, depending on the animal's behavior Xylazine Hydrochloride (0.3-0.5 mg/kg) injected intravenously and casted with twitched. A small amount of water fed to animals [Traub and Brown 1997]. after rubbing gel on it and pouring some Lidocaine in to nostril, 2 meter or 3 meter endoscopic devices (VFS200 or VFS300) conducted through to the nostril. Blowing air and inducing water help for opening the path to the endoscope, after entering into the stomach would help cleaning gastric mucosa. By rotating the endoscope in the gastric different part of stomach (Greater curvature, lesser curvature, non-glandular part, glandular part and Margo Plicatus) could be observed in the presence of wound location, extent and degree of the detected lesions were graded from zero to four were:

Zero: normal gastric mucosa

I-: hyperemia and gastric hyperemia

II-: small erosions limited to the mucosa

III-: wide mucosal erosions

IV-: deep and extensive mucosal ulceration [6].

Laboratory work:

T3, T4 hormones and cortisol levels were measured by IDEXX ELISA kit on blood samples were collected.

RESULTS

24 Arabian horses have been studied in this research. Horses were 5-14 years old, 12 female and 12 were male. 15 horses, (62.5%) had gastric ulcers (Fig.1), 11 horses (73.33% of horses which suffered from gastric ulcers) had the ulcer in the non-glandular, and 4 horses (26.67%) had those ulcers in the glandular part.

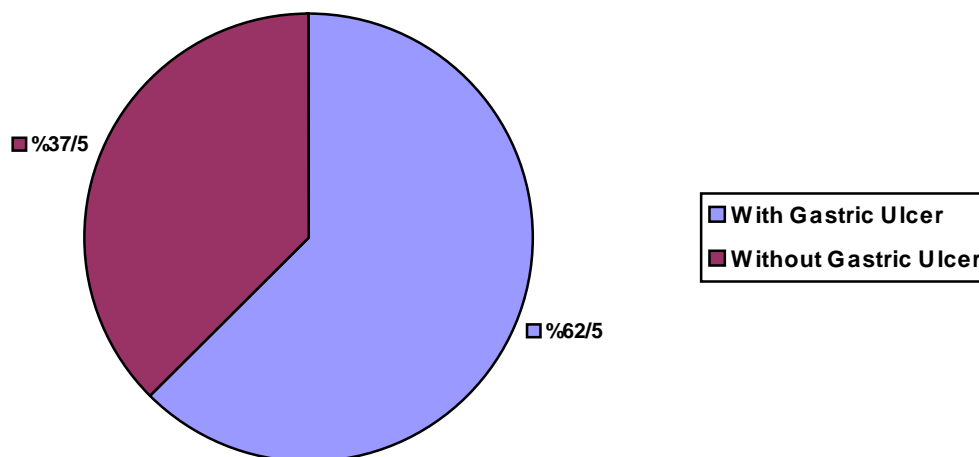


Fig.1- Arabian horses based on whether or not have gastric ulcers

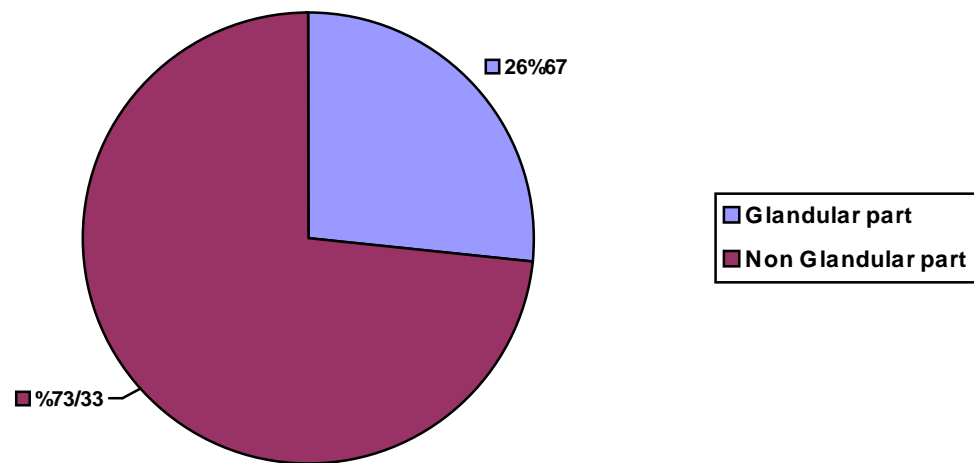


Fig.2- The prevalence of gastric ulcers in the glandular or non glandular part in the studied Arabian horses

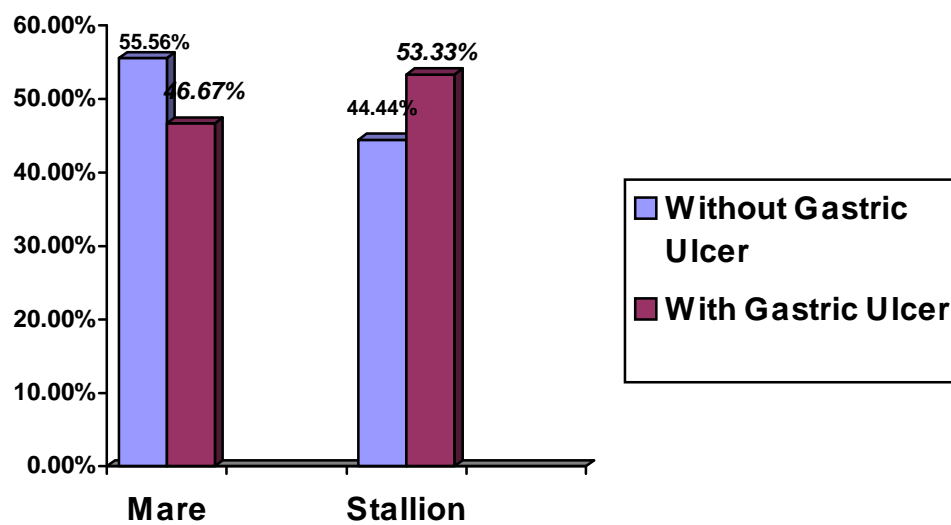


Fig.3- The occurrence of gastric ulcers in the horses of this study according to their sex

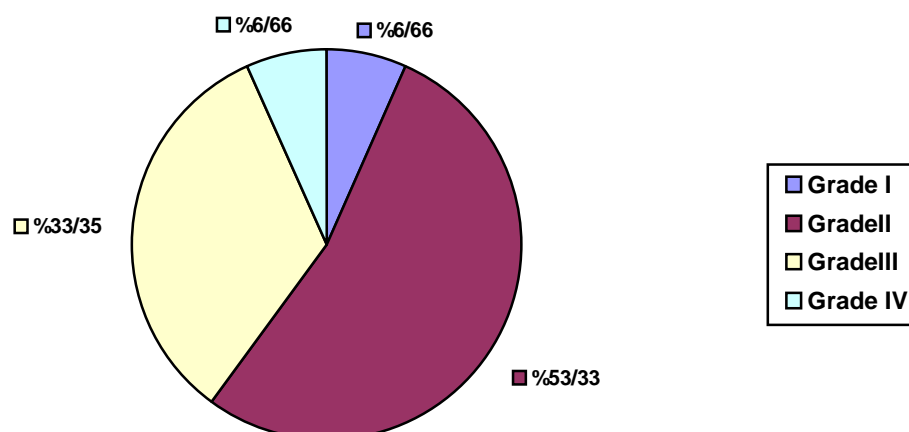


Fig.4- The prevalence of gastric ulcers in horses based on its severity

13 Arabian horses which suffer gastric ulcers had heavy physical activity (racing horse or free-riding) and two of them had light physical activity (light activity or resting) were positive (Figure 5).

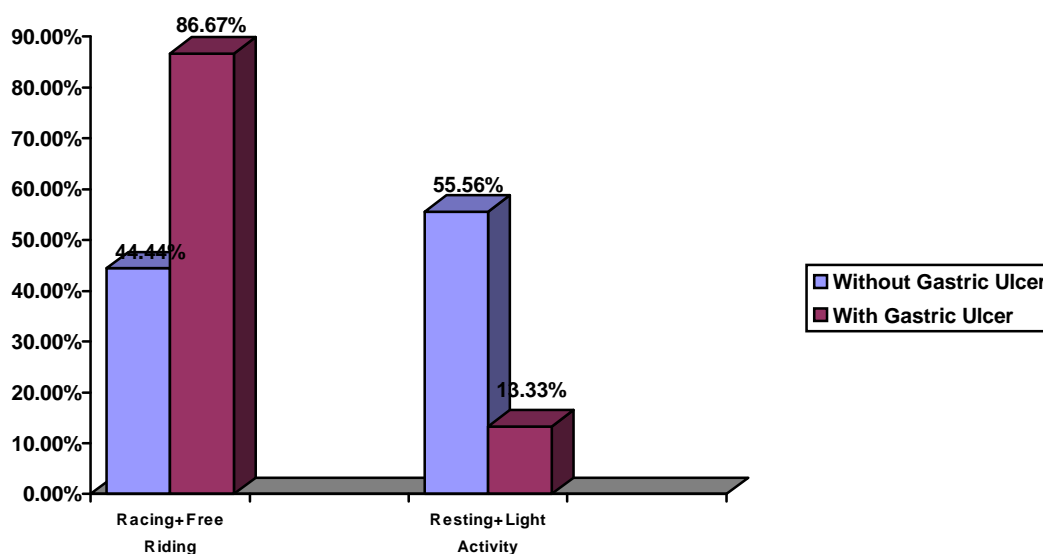


Fig.5- The occurrence of gastric ulcers in horses based on their activity

Mean serum levels of thyroid hormones and cortisol in Arabian horses with and without gastric ulcers is outlined in Table 1. Mean T 3 in Arabian horses with gastric ulcers 116.61 ng/dl and in horses without peptic ulcer 98.54ng/dl, the mean difference in the levels between the two groups was significant (Table 2). Mean T 4 levels in Arabian horse under the training of horses with gastric ulcers was 2.09 µg/dl and in horses without ulcers was 2.12 µg/dl, and the difference between the mean levels between the two groups was not significant . Mean serum cortisol in horses without a gastric ulcer was 2.72µg/dl and in horses with ulcer was 2.43µg/dl, and there were no significant differences between the two groups.

Table 1: Mean serum hormone findings in the two groups studied Arabian horses with gastric ulcers and without gastric ulcers.

	Measured Hormones	Number	Average	Standard Deviations	Standard error of the mean
T ₃	ng / dl Without Gastric Ulcer	9	98.54	4.2478	0.88224
	With Gastric Ulcer	15	116.61	3.8144	0.75515
T ₄	μg / dl Without Gastric Ulcer	9	2.12	0.3335	0.08523
	With Gastric Ulcer	15	2.09	0.3956	0.08457
	μg / dl Cortisol Without Gastric Ulcer	9	2.27	0.1803	0.09630
	With Gastric Ulcer	15	2.43	0.5094	0.1413

Table 2: The mean serum levels of thyroid hormones and cortisol in both groups of Arab horses with gastric ulcers and without gastric ulcers.

Measured Hormone	Group	Average	Variance	t	Significant	Correlation
ng / dl T ₃	With Gastric Ulcer	116.61	0.443	2.969	×	
	Without Gastric Ulcer	98.54				
μg / dl T ₄	With Gastric Ulcer	2.09	0.038	2.159	ns	
	Without Gastric Ulcer	2.12				
Cortisol μg / dl	With Gastric Ulcer	2.43	0.383	1.287	ns	
	Without Gastric Ulcer	2.27				

ns : Not significant correlation

× : Significant correlation ($P < 0.05$)

DISCUSSION

Endoscopic diagnoses of gastric ulcers in horses of other breeds have been developed by others, but, the Arabian horse is presented for the first time in Tabriz. Andrews et al. Evaluated and reported gastric ulcers by endoscopy in the [7]. Murray et al studied mucosal changes in gastric ulceration in Thoroughbred foals [8]. 62.5% Arabian horses in this study had gastric ulcers (Figures 11). Brown and colleagues studied the incidence of gastric ulcers in 30 Thoroughbred, with endoscopy and they reported the incidence of ulcer 53.4% [9]. Dionne et al reported the occurrence of gastric ulcers in Standardbred 44% and 63.3% in horses which do exercise [10]. McClure and colleagues studied 27 horses gastric ulcer with endoscopic and the incidence was reported in 58% of cases [11]. Murray studies on 47, 1-25 years old Quarter and Thoroughbred incidence of gastric ulcers, 43% were presented [11]. Nieto and colleagues study on the Andalusian horses and incidence of gastric ulcer was reported 67% in these horses [12]. Begg and colleagues in Australia, according to a regional study on the incidence of gastric ulcers in horses 69.4% was reported [13]. In a study the incidence of gastric ulcer in non-glandular part was reported 87.76% [14].

Horses which were studied in this study were from different age ranges, because sometimes horses just about every age group of study were only one horse. It was impossible to compare the incidence and severity of gastric ulcers statically. To compare the incidence and severity of gastric ulcers in different ages and determine the relationship between gastric ulcer and horse ages in endoscopic study, there should be several horses from various ages in different groups to be justified statistically, and this study has not addressed this issue.

In this study it was found that the incidence of gastric ulcers in non-glandular part of the stomach is more than glandular (Figures 13-3 and 14-3). Difference in the incidence of gastric ulcers was significantly different between the two area ($p < 0.01$). Our findings are consistent with other findings [15 ,16]. Peptic ulcer occurs when the factor which causes gastric ulcers, the most important is Chloridric Acid, and safety mechanisms are not balanced. The glandular part of gastric due to a layer of bicarbonate mucus, mucosal blood flow and PGE2 has good resistance against acid, but the non-glandular do not have such resistance, so the occurrence of gastric ulcers in non-glandular part is more than glandular part [3]. As it can be seen in Figures 13, the event of gastric ulcerin in the Arabian stallion is more than mare (46.67% mare and 53.33% stallion). Because, owner take more care about mare than stallion and mare is lower than [17]. It seems that gastric ulcer incidence is higher in stallion, and there is a correlation between gastric ulcers and gender. The occurrence of gastric ulcers in Arabian stallion is more but the difference was not significant. In a study conducted ulcer incidence in both sexes in Thoroughbred horses with endoscopy examined and significant correlation has not been reported [16]. In figure 14 it specified that grade II ulcers is more than others, but there was no significant difference between different grades of gastric ulcers. In other finding grade II ulcer occurrence, has been reported more than other grades too, and the exact cause of this is not mentioned in the references [2]. 86.67% of peptic ulcers in horses with heavy work (duty) and 13.333% of the horses with the light activity was observed (Fig. 15) and a significant relationship between the type of horse activity and the occurrence of gastric ulcers was found ($p < 0.05$). The occurrence of gastric ulcers in horses varies depending

on the animal's physical activity. The occurrence of peptic ulcer in race horse is more than showing horses and horses with no activity [16]. At exercise time the release of gastrin increases and with increased release of gastrin secretion of gastric hydrochloric acid increases too and the area of damage to the gastric mucosa increased and gastric ulcers occur [18] the high incidence of gastric ulcers in horses with heavy work (duty) may be due to this reason. In another research also showed a significant association between heavy physical activity and incidence of peptic ulcer has reported [19,20], and the results of further study of gastric ulcers in horses that was reported by Nieto et al was the same, but the correlation was not significant [12].

In this regard, Murray et al. have performed an interesting experience as follows: the gastric of 67 Thoroughbred that were in the process of getting ready for the tournament, gave endoscopy. 2-3 months later, this endoscopy repeated on 35 of them. Horses were aged 2 to 9 years. 42 of them 2 months sooner the first endoscopy were in race and other 25 s were being prepared for competition. A total of 62 horses (93%) of the 67 horses had participated in one or more of the lesions in their stomachs. 32 horses of the 35 that got gastroscopy again in first and all of them in second gastroscopy showed gastric ulcer. 24 horses of this 35 horses which got gastroscopy for the second time, lesions were greater than, in 5 horses there were not any differences and in 6 horses the lesions got smaller. Although in both processes of gastroscopy lesions were in gastric glandular part, also a significant difference in the mean number of lesions was found in two stages. Finally, it was concluded that the average number of squamous epithelial lesions in horses over two months before the competition, significantly greater than the other horses. However, this difference was not significant in the glandular. Murray and colleagues also confirmed the findings of other recent observations [8]. As it is shown in Tables 1 and 2, mean serum of T3 and cortisol in horses with gastric ulcers was higher than the healthy horses, and about T3 the difference was significant ($P < 0.05$) but was non-significant in cortisol. The mean serum of T4 in horses without gastric ulcer was a little higher than the horses with gastric ulcer and the difference was not significant. The cause of increased serum levels of thyroid hormones and cortisol in horses is stress of heavy exercise [21]. Because in this study horses with heavy work (duty) suffer gastric ulcer more than horses at rest thus, high levels of thyroid hormones and cortisol in horses with gastric ulcers can be attributed to the heavy work of horses and such as that in horses with gastric ulcers, thyroid hormones and cortisol levels due to stress will be high activity [18]. In a study, evaluated the relationship between stress role in causing stomach ulcers. 16 young foal, which had been under stress of disease, endoscopy was performed and the hormones T3 (triiodothyronine), reverse T3, T4 (thyroxine) and cortisol levels were measured. From 16 foals in exam group, in 6 foals, cortisol, in 7 foals, T3 and in 12 foals T4 levels were higher than normal level. 40% of the foals in examine group gastric ulcer showed in endoscopic observation. Only 30% of control foals had such lesions. The number and severity of gastric ulcers in exam group was much higher than gastric ulcers in control group. Moreover, gastric ulcers in exam group were in glandular part [18]. In another experiment the gastroscopy had done on 75 apparently healthy 2 to 85 days old foals. Lesions were found in the foals which had a history of disease, particularly diarrhea, were more than the foal which had not such history [8].

The final outcome is that peptic ulcer in Arabian horses had a positive correlation with serum levels of thyroid hormones and cortisol and elevated levels of these hormones follow the stress may determine susceptibility to gastric ulcers.

REFERENCES

- [1] Colhan, P.T., Mayhew, I.G., Merritt, A.M. and Moore, J.N. **1999**. Equine Medicine and Surgery, fifth edition, Mosby company, S.T. Louis, PP:715-720.
- [2] Mair, T., Divers, T. and Ducharme, N. **2002**. Manual of Equine Gastroenterology, Fifth edition, Saunders Company, PP: 241-245.
- [3] Radostits, O.M. Clive, C., Gay, Kenneth, W., Hinchcliff, C. and Peter, D. **2007**. Veterinary Medicine 10 the ed Bailliere Tindall London. PP:280-281,374-380,1944.
- [4] McClure, S.R., Carithers, D.S., Gross, S.J. and Murray, M.J. **2005**. *American Journal of Veterinary Medical Association*, 227: 775-777.
- [5] Lewis, S., **2003**, Gastric ulceration in an equine neonate, *The Canadian Veterinary Journal*, 44: 420-421.
- [6] Reed, S.M. and Bayly, W.M. **2004**. Equine Internal Medicine, Saunders Company, Philadelphia PP: 862-869.
- [7] Andrews, F.M. and Nadeau, J.A. **1999**. *Veterinary Journal, Supplement*, 29: 30-33.
- [8] Murray, M.J., Nout, Y.S. and Ward, D.L. **2001**. *Journal of Veterinary Internal Medicine*, 15: 401-406.
- [9] Brown, C.M., Slocombe, R. and Derksen, F.J. **1985**. *American Journal of Veterinary Medical Association*, 186: 965-968.
- [10] Dionne, R.M., Vrins, A., Doucet, M.Y. and Pare, J. **2003**. *Journal of Veterinary Internal Medicine*, 17: 218-222.
- [11] McClure, S. R., Glickman, L. T. and Glickman, N.W. **1999**. *American Journal of Veterinary Medical Association*, 21:1130-1133.

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- [12] Nieto, J.E., Snyder, J.R., Beldomenico, P., Aleman, M., Kerr, J.W. and Spier, S.J. **2004**. *Veterinary Journal*, 167: 33-37.
- [13] Begg, L. M. and O'Sullivan, C. B. **2003**. *Australian Veterinary Journal*, 81: 199-201.
- [14] Roy, M.A., Vrins, A., Beauchamp, G. and Doucet, M.Y. **2005**. *Journal of Veterinary Internal Medicine* 19: 744-750.
- [15] Goodrich, L.R., Furr, M.O., Robertson, J.L. and Warnick, L.D. **1998**. *Journal of Veterinary Pharmacology And Therapeutics*, 21: 24–33.
- [16] Vatistas, N.J., Snyder, J.R., Carlson, G. and Johnson, B. **1994**. Epidemiological study of gastric ulceration in the Thoroughbred race horse: 202 horses 1992-1993, Proceedings of the Annual Convention of the American Association of Equine Practitioners, PP: 125-126.
- [17] O'Conner, M.S., Steiner, J.M., Roussel, A.J., Williams, D.A., Meddings, J.B., Pipers, F. and Cohen, N.D. **2004**. *American Journal of Veterinary Research*, 65: 31-39.
- [18] Furr, M., Taylor, L. and Kronfeld, D. **1994**. *Cornell Veterinarian*, 84: 41–45.
- [19] Hammond, C.J., Mason, D.K. and Watkins, K.L. **1986**. *Equine Veterinary Journal, Supplement*, 18: 284-287.
- [20] Hartmann, A.M. and Franken, R.L. **2003**. *Journal of Equine Veterinary Science*, 23: 560-561.
- [21] Ringger, N.C., Lester, G.D., Neuwirth, L., Merritt, A.M., Vetro, T. and Harrison, J. **1996**. *American Journal of Veterinary Research*, 57: 1771-1775.