STUDIES ON HORSES IN TURKEY

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ABSTRACT

Horse was used as an essential transportation tool in both Turkey and world for long years after domestication. It was also significant object in the life of Turks. Majority of ancient Turkish poems and tales includes horse and horsemanship. Jereed, some kind of game being played with horse, was most favorite sport of Turk's ancestors.

A number of studies were undertaken in the branches of horse breeding, diseases and cures after declaration of Republic in Turkey. In this paper, the above mentioned studies belonging to biochemistry, virology, microbiology, parasitology, surgery, internal diseases reproduction, and zootechny subdivisions of Veterinary science are summarized.

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INTRODUCTION

The horse is accepted to be domesticated by some Turkic tribes in middle Asia at 3000 BC. The type of horses bred varies according to the aim. They are used for different goals including agriculture, transport, and sportive activities in both Turkey and throughout the world.

Horse has an important role in literature, poems, sports and games of Turks. Even funeral ceremonies were also realized for horses by some sultans and commanders in Turkish history. For instance, Sultan Osman III. got a tomb build for his horse named Sisli Kır and Baba Kuruş, most known race horse in Turkey, were buried in a grave prepared for it in Karacabey stud farm. The horse motifs are extensively used by some Turks to express their thoughts in proverbs.

-People who ride a borrowed horse, get off quickly.

(İğreti ata binen tez iner.)

-A horse neighs according to it is owner

(At sahibine göre kişner.)

When Turkish immigrants were coming from Middle Asia to Anatolia, they brought their horses along with them, and thus thousands of mounted warriors could be ready for the battles. Therefore Turks especially Ottomans attached more importance to horse breeding.

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Raiders (Akıncılar) and Sepoys (Sipahiler) were the cavalry divisions of Ottoman's Army. As the Turkish traveler Evliya Çelebi wrote in 16th century, the army had more than 166.000 mounted cavalries, and this number could be easily increased to 200.000. Accompanying with the descending period of Ottoman state, these foundations were closed or became unworkable, and finally even almost all the stud animals were sold during the World War I.

Following the establishment of Turkish Republic the state commenced to give great importance the horse breeding again. Numbers of stud farms were increased and the strong draft and saddle horses were aimed to be bred until the World War II. Some crossbreds were created by crossing purebred Arabian, Nonius, Percheron and Ardene horses to use in military and agricultural purposes. Unfortunately the expected benefit was provided by only Arabians and the others did not draw the public interest. Hence breeding of cold blooded horses, such as Nonious was terminated. But Turkish farmers were demanding strong draft horses in those years. Therefore Haflinger horses were imported and started to be bred in Karacabey stud farm. This horse founded an acceptance by Turkish farmers. Haflinger and its crosses are used by some small scale farm operations in Western Anatolia highlands even today.

Because of high interest of Turkish people to horse races, the significance of Arabian and Thoroughbred breeding have considerably increased in Turkey. While the Arabians are maintained at Karacabey, Sultansuyu and Anadolu state and some private farms, the thoroughbreds are grown by only individual entrepreneurs. Additionally a common horse breeding is being done for amble races and some sportive activities like jeered throughout Turkey (Arpacık, 1994; Akçapınar and Özbeyaz, 2006).

In this study, it was aimed to give some information about the scientific studies in the scopes of horse and horse breeding in Turkey.

STUDIES IN BASIC SCIENCES

It is important to determine some blood and serum biochemical values in disease diagnosis, treatment, and prognosis.

In different studies (Uysal at all., 2001; Çöteloğlu at all., 2001; Arslan at all., 2002) various hematological and serum biochemical values such as CK (Creatin kinase), LDH (Lactate Dehydrogenises), MCV (Mean cell Volume) and some plasma enzymes and levels of lipid and proteins were identified. Uysal at all. (2001), examined and compared some of them in Turkish working and racing horses, concluded that the differences between two types were significant for some parameters such as haemotocrit, monocyte and serum creatinine. The authors assigned the differences to dissimilarities in nutrition of horse groups.

Bilal and Meral (2002) reported that the values of total leukocyte, lymphocyte and mean cell volume were as 8.84, 3.25, 43.28 in Arabian horses, 9.56, 2.87, 39.97 in thoroughbred horses respectively.

Or at all (2004) reported that LDH (lactate dehydrogenize) and Cu levels were significantly decreased in rachitism observed foals.

STUDIES IN VIROLOGICAL, MICROBIOLOGICAL AND PARASITOLOGICAL SCIENCES

Infectious disease decreases the performance of animals. The horses are asked to be free of disease when transportation from one country to another.

Equine infectious anemia in Turkey was first found by Akçay, Halıcıoğlu and Noyan in horses between 1953-1958. But in following years Burgu at all. (1989) and Turan at all (2002) collected the racing horse blood samples under the sterile condition in the kaolin tubes and sera were separated. All samples seemed to be negative according to the AGID test results. These results showed that the Marmara region and three state farms, including Karacabey, Sultansuyu and Anadolu are free from the equine infectious anemia. The disease was prevented with the measurements taken by Turkish governments.

According to previous bacterial studies (Erdeğer at all., 1999; Erdeğer at all., 2002; Yurdaydın at all., 1992; Seyrek-İntaş at all., 1997; Ülgen at all., 2001) researchers notified that the identification of different bacteria such as β-Hemolytic streptococci and Taylorella equigenitalis which may effect fertility in mares, and therefore treatment of infected mares in breeding season is important for decreasing embryonic deaths and infertility problems in horses of Turkey.

Meanwhile, Rhodococcus equi infections are becoming more important in foals because of high mortality. Therefore early diagnosis is very important to save the foals. The results reported by Özgür at all. (2002) indicated that virulent R. equi is widespread in thoroughbred foals in the Marmara region and ELISA is useful for the early diagnosis of R. equi infection in foals.

According to some researchers (Burgu at all., 1995a; Burgu at all., 1995b; Demir at all., 1993; Gül at all., 2003) Trematods such as Dicrocoelum Dendriticum and Fasciola hepatica; Cestods such as A. Perfoliata, A. magna and Paranaplocephala mamillana; Nematods such as strongylus vulgaris, strongylus equinus, strongylus edentatus were encountered in different regions of Turkey.

STUDIES IN CLINICAL SCIENCES

Early diagnosis and treatment of disease play an important role in effective race life of Arabian and thoroughbred horses in Turkey.

Anteplioğlu (1984) stressed that the importance of epiphyseal closure time of Arabian foals in their growing and found that this event was realized between 9 and 30 months of age.

Samsar at all. (1988) notified that the polyester fiber could successfully be used in case of single tendo in the tendon injuries of horse an donkeys.

Vural at all. (1997) and Vural at all. (1998) stated that ultrasonographical, cytological, histopatological and microbiological examinations have an important role on the monitoring of the endometrial pathological changes that reduce foaling potentials of the mares.

Fertility is very important factor in horse breeding. Semacan at all. (1998) notified that the reduced oestrus and ovulation times occurred because of enlarged follicle diameters during $PGF_{2\alpha}$ injection and concluded that evaluation of ovaries for follicle structures before $PGF_{2\alpha}$ injection would be beneficial. In addition, Kılıçaslan (2002) notified the results of his study indicated that the deslorelin treatment could be used successfully in the mares with dominant ovarian follicle (>30 mm) to induce the ovulation within 48 hours after administration and reduce the mating number per mare.

Alkan at all. (2003) concluded that 14 days vaginal progesterone treatment and a $PGF_{2\alpha}$ administration on withdrawal day can be used to induce estrus and ovulation at any stage of the breeding season in mares, and to achieve pregnancy. On the other hand more successful results could be obtained by treatment during the later months of the breeding season.

Horoz at all. (2002) was aimed to reduce the early twin pregnancies to single pregnancies in the mares by crushing and concluded that the success rate for crushing of embryos of 16-22 and 22-28 days were 78.9 % and 42.8 % respectively.

Semacan at all. (2002) notified that oestrous behaviours and follicular development were examined with daily teasing and rectal palpation every other day and concluded that measurement of vaginal resistance is not effective means of oestrous detection but vaginal resistance values could be useful to predict ovulation time in mare.

Carioğlu at all. (2001) recommended 1000 mg of MAP (Medroxy Progesterone Acetate) application at intervals of 4 days in prevention of luteal insufficiency, one of the important reason of low fertility in thoroughbred mares.

Aslan at all. (1996) reported that after 15th day of pregnancy real time ultrasound scanning can be used in mares without any hesitation and successful results can be taken by breeding the mares after detecting the ovulations of the preovulatory follicles. When the follicles reach a given growth (35 mm) the real time ultrasound scanning controls must be done 2 times a day with 12 hours intervals.

STUDIES IN ARTIFICIAL INSEMINATION

Different kinds of studies were undertaken on dilution, frosting and solution of sperm for artificial insemination in horses.

Some researchers notified that using the lactose and Glucose-Lactose-Egg York diluents to freeze the sperm gave more useful results than the others (Kozandağı and İşler, 1981; Tuncer, 2001).

The results achieved in Yurdaydın's studies (1984, 19986, 1987, 1989) showed that the stallion semen can be safely frozen under moderate laboratory conditions and used in Turkish horse breeding effectively.

In a study reported by Gündüz at all. (2000) sperm quality in sperm samples which were taken at different season were analyzed for sperm volume, pH, mortality %, dead sperm ratio and acrozomal defected spermatozoa rate. They stated that the good quality semen samples were obtained in spring.

Ak at all. (2001) stressed that semen has to be extended before centrifugation and seminal plasma is deleterious if the semen is weak against freezing procedures and seminal plasma has no harmful effect on the post-thaw motility and acrozomal morphology of the semen which can be frozen successfully.

STUDIES IN ZOOTECHNY

In Turkey, Zootechnical studies have been focused on determination and improvement of some characteristic and performance traits in horses.

Demirci (1985) found that the oestrus period as 5.54 days and the duration of oestrus cycles was 21.64 days in Arabian mares. In addition, Keskintepe at all. (1988) were determined that the first oestrus, called foal heat occurred after 9 days postpartum.

Pregnancy rates were among 81.89 - 87.7 for Arabian, 67.9 - 74.9 for Haflinger, and 74.2 - 79.9% for Arabian x Haflinger crosses bred in Karacabey stud farm. Parturition rate in the same operation was found to be 64.7 - 80.0; 64.7 - 67.8 and 74.2 - 79.9 % respectively (Küçük and Altınel, 1992a; Demirtel, 1975; Yurdaydın 1982).

Akkayan and Demirtel (1973) reported that the gestation length for male and female fouls were 338.06 and 335.92 days respectively. In this study, the effects of month, gender, age of mare and stallion on gestation length were also significant.

In the studies of foals, mean birth weights were 40-47 kgs in Arabian foals and 39-41 kgs in Haflingers (Altınel and Küçük, 1992b; Akandır, 1983; Akdoğan, 1949; Batu, 1965). Livability up to 24 months of age was found to be 91.0 % in Arabian horses and 95.9 % in Haflingers (Küçük and Altınel, 1992a).

Kutsal and Sandıkçıoğlu (1985) reported that the coat colours of Arabian horses were as 74.55 % red, 19.20 % chestnut, 5.50 % grey and 0.25 % dark in 1963-1979.

Doğan at all. (2002) estimated the heritabilities of heart girth, height at withers, and cannon bone circumferences as 0.22, 0.23, 0.15 respectively. Meanwhile Ekiz et all. (2005) calculated the heritabilities of racing times ranged from 0.175 to 0.304 depending on racing distance in Arabian horses. Köseman (2005) found the heritability of bonus gained as 0.46. Meanwhile the same researcher stated that the horses imported from Hungary to Turkey for using as police horse carried the morphological similarities with the Arabian, thoroughbred, Holstein and Hannover horses, and the blood serum proteins had also some similarities to that of these breeds. (Köseman, 1998).

Kopar (2000) notified that the gene frequencies in blood groups and protein polimorphysm in thoroughbred horses in Turkey were similar to that of thoroughbred horses in Europe.

RESULTS

In conclusion, the efforts in horse breeding gained more momentum after announcement of Republic of Turkey. The survey studies were broadly completed and the position of horse breeding was revealed. Transferring the scientific results to practice and drawing more attention of Turkish people to horse breeding industry will be useful for a sustainable development of our country.

REFERENCES

Ak, K., Bacınoğlu, S., Cirit, Ü., İleri, İ.K.: Effect of Centrifugation and Seminal Plasma on the Freezing of Stallion Semen. The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2001, 27 (1): 329-338

Akandır, M. : The effects of Some Environmental Factors on Growth rate of Purebred Arab Foals. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1983: 30 (4): 509-529

Akçay, S.: Yurdumuz atlarında anemi enfeksiyözün zuhuru ve anatomo-histopatolojik teşhisinin değeri. Turk Vet. Hek. Derneği Derg. 1953, 76-77:479-505 (cited from Burgu at all., 1989)

Akdoğan, E.: Karacabey Harası Safkan Arap ve Yarımkan Arap Atlarının Ağırlıkları. Turk Vet. Hek. Derneği Derg. 1949: 19 (37): 414-428 (cited from Altınel and Küçük, 1992).

Akkayan, C., Demirtel, E.: Untersuchungen über manche Faktoren, die schwangerschaftsdauer von Arabien Stuten bei gestüt Karacabey neeinflussen. The Journal of The Faculty of Veterinary Medicine University of Ankara. 1973: 20 (4): 575-585

Alkan, S.,Horoz, H., Kasıkçı, G., Sönmez, C., Ak, K.: Effects of Intravaginal Progesterone Administration on Fertility in mares during different periods of the breeding season. The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2003, 29 (1): 111-117

Altınel, A., Küçük, H.: The studiesn on Some Characteristics of Arap, Haflinger and Arap x Haflinger F_1 Horses at Karacabey State Farm: II. Growth and Body Weight. Journal of Lalahan Livestock Research Institute. 1992: 32 (1-4):83-97

Anteplioğlu, H.: Experiments on the Age and Manner of Epiphyseal Closure time in The Thoroughbred Arabian Foals. The Journal of The Faculty of Veterinary Medicine University of Ankara. 1984, 31 (1): 31-40

Arslan, M., Özcan, M., Tosun, C., Çöteloglu, Ü., Matur, E.: The Effects Of Physıcal Exercıse On Some Plasma Enzymes And Ca And P Levels In Race Horses. The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2002, 28 (1): 91-97

Aslan, S., Çelebi, M., Fındık, M., İzgür, H., Koç, M.: Detection and Serial investigation of ovulation time and early pregnancy in pure breed arabian mares using real time ultrasound scanning. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1996, 43: 341-347

Batu, S.: Experience in breeding haflingers in Turkey. Haflinger ein Pferd erobert die herzen der Völker, Troiler Grapnic, Innsburck.1965

Bilal, T., Meral, Y.: Haematologic Values in Thoroughbred English and Arabic Horses. . The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2002, 28 (1): 199-207

Burgu, İ., Akça, Y., Toker, A., Alakan, F.: Serological Survey of Infectious Anemia in Horses. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1989, 36 (1): 123-128

Burgu,A., Doğanay, A., Öge, H., Öge, S., Pişkin, Ç.: Helminth Species found in Horses. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1995, 42: 193-205

Burgu,A., Doğanay, A., Öge, H., Sarımehmetoğlu, O., Ayaz, E.: Helminth Species found in Donkeys. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1995, 42: 207-215

Carioglu, B., Senünver, A., Horoz, H., Kılıçarslan, M.R.: Prevention of an Early Embriyonic Loss with Progesterone and Gonadotrophine Realising Hormone (GnRH) in Mares. The Journal of the Faculty of Veterinary Medicine İstanbul University. 2001, 27 (1): 229-241

Çöteloglu, Ü., Arslan, M., Matur,, E., Bakırel, U., Özcan, M., Tosun, C.: The Effects of Physical Exercise on Some Physiological Parameters, Plasma CK and LDH Levels in Horses That are Breeded as Race Horses. The Journal of the Faculty of Veterinary Medicine İstanbul University. 2001, 27 (2): 609-615

Demir, S., Tınar, R., Çırak, V., Ergül, R.: Bursa yöresi tektırnaklılarda görülen helmint türleri ve yayılışı. 1993, 8. Ulusal parazitoloji kongresi, 7-10 eylül Trabzon. (cited from Burgu at all., 1995)

Demirci, E.: Estrus and Estrous cycle in Purebred Arab Mares Raised in Sultansuyu State Farm in Turkey. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1985: 32 (1): 23-32

Demirtel, E.: Karacabey Harasında Yetiştirilen Haflinger ve Yarımkan Haflinger atların Gelişme Beden Yapıları ve çeşitli verim özellikleri. Lalahan Zootekni Araştırma Enstitüsü yayınları.1975 Yayın No:39

Doğan, İ., Akcan, A., Koç, M.: Investigation of Important Body Measurements in Pure-Bred Arabian colts and Fillies. Turk J. Vet. Anim. Sci. 2002, 26: 55-60

Ekiz, B., Koçak, Ö., Demir, H.: Estimates of Genetic Parameters for Racing Performances of Arabian Horses. Turk J. Vet. Anim. Sci. 2005, 29: 543-549

Erdeğer, J., Akan, M., Dakman, A., Altay, G., Vural, R., Çelebi, M.: Identification and Serological Grouping of β- Haemolytic Streptocci Isolated From Genital Organs of Mares. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1999, 46: 69-76

Erdeğer, J., Akan, M., Dakman, A., Altay, G., Vural, R., Çelebi, M.: Bacteriological and Serological Diagnosis of Taylorella equigenitalis in Horses. Veterinarry Journal of Ankara University. 2002, 49: 39-44

Gül, A., Serdar Değer, S., Ayaz, E.: The Prevalences of Helminth Species According to Faecal Examination in Equids in Different Cities in Turkey. Turk J. Vet. Anim. Sci. 2003, 27: 195-199

Gündüz, H., Doğan, İ., Mert, N., Ekin, S.: Seasonal Changes of The Some Biochemical Parameters in The Seminal Plasma and Blood Plasma of Arabian Stallions and Their Effects on Sperm Quality. Yüzüncü Yıl Üniv. Vet. Fak. Derg. 2000, 11 (2): 90-94

Hakioğlu, F.: Yurdumuz atlarında anemi enfeksiyöz hastalığının teşhisi için karaciğerde histopatolojik araştırmalar. Ankara Üniv. Vet. Fak. Derg. 1955, Yayın No: 61 (cited from Burgu at all., 1989)

Horoz, H., Kılıçarslan, M.R., Alkan, S., Ak, K., Kasıkçı, G., Tek, Ç.: Reduction of Early Twin Pregnancy to Single Pregnancy in The Mare by Crushing. The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2002, 28 (1): 81-84

Keskintepe, L., Alpar, R., Küplülü, Ş.: Studies on Reproductive Performance on Pure Arabian Mares in Çifteler Anadolu State Farm. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1988: 35 (2-3): 488-496

Kılıçarslan, M.R.: Induction of Ovulation with The GnRH Analogue, Deslorelin Acetate in Mares. The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2002, 28 (2): 403-409

Kopar, A.: The Estimation of Blood Group and Blood Proteins Gene Frequencies In Thoroughbred Horses Breeding In Turkey. Ph.D, Thesis, 2000, Ankara.

Kozandağı, M., İşler, M.: The Possibility of Freezing Stallion Semen Liquit Nitrogen in Turkey. Journal of Lalahan Livestock Research Institute. 1981, 21 (3-4):63-72

Köseman, A.: Arap atlarında yarış performansının kalıtım derecesinin hesaplanması ve ana yaşının yarış performansına etkisi. Doktora tezi, Ankara Üniversitesi Sağlık Bilimleri Enstitüsü, 2005, Ankara.

Köseman, A.: Some Morphologic Characteristics and Blood Polimorphism of The Horses Imported From Hungary. MSc Thesis, 1998, Ankara.

Kutsal, A., Sandıkçıoğlu, M.: Coat Colours and Markings on Head and Legs on Their Genetic Aspects ın Arabian Horses in Turkey. Lalahan Livestock Research Institute. 1985, 25 (1-4):3-29

Küçük, H., Altınel, A.: The studiesn on Some Characteristics of Arap, Haflinger and Arap x Haflinger F_1 Horses at Karacabey State Farm: I. Fertility and Survival Rate. Journal of Lalahan Livestock Research Institute. 1992: 32 (1-4): 73-82

Noyan, A.: Anemia infectiosa equorum'lu safkan Arap atlarında hematolojik araştırma. Ankara Üniv. Vet. Fak. Derg. 1958, 5 (3-4):209-241(cited from Burgu at all., 1989)

Or, M.E., Gönül, R., Özçelik, D., Gülyasar, T., Gülanber, E.G., Kaya, Ü., Barutçu, Ü.B., Dodurka, H.T.: Serum ALP, LDH, Ca, P, Fe, Cu, and Zn Levels in Rachitism observed Foals. The Journal of the Faculty of Veterinary Medicine İstanbul University. 2004, 30 (1): 61-66

Özgür, N.Y., İkiz, S., Bağcıgil, A.F., Carioğlu, B., Akay, Ö., Ilgaz, A., Takaı, S.: Studies on Early Diagnosis of Rhodococcus equi Infection by ELISA in Foals from Racehorse Breeding Studfarms in the Marmara Region. Turk J Vet Anim Sci., 2002, 26: 1427-1434

Samsar, E., Tanyolaç, A., Güzel, N., Özkul, İ.A., Özkan, K., Göçe, P., Özgencil, E.: The use of polyester fibre implants in the tendon injuries of mare and donkeys. Ankara Üniv. Vet. Fak. Derg. 1988, 35 (2-3): 396-411

Semacan, A., Demirel, M., Taşal, İ.: The Effect of Follicle Diameter on Oestrus and Ovulation Time During $PGF_{2\alpha}$ Injection in Mares. Turk J. Vet. Anim. Sci. 1998, 22: 359-362

Semacan, A., Taşal, İ.: Estrus cycle patterns in mare monitored by electrical resistance values of the vaginal mucosa. YYÜ. Vet. Fak. Derg. 2002,13(1-2):114-116

Sevinç, A., Yurdaydın, N., Tekin, N.: Karacabey harası Safkan Arap ve Haflinger aygırlarından alınan spermaların dondurulması ve Haflinger kısraklarından elde edilen döl verimi. Ankara Üniv. Vet. Fak. Derg. 1984, 31 (2): 304-315

Seyrek-İntaş, K., Ülgen, M., Mısırlıoğlu, D.: Bursa yöresinde kısraklarda klinik bakteriyolojik ve sitolojik muayeneleri ile genital enfeksiyonların belirlenmesi. Ankara Üniv. Vet. Fak. Derg. 1997, 43: 1-9 (cited from Erdeğer at all., 1999)

Tuncer, P.B.: The Studies on In- Vitro Evaluation of Stallion Semen Frozen with Different Extenders. Journal of Lalahan Livestock Research Institute. 2001, 41 (2):1-10

Turan, N., Yılmaz, H., Uysal, A., Arslan, M.: Seronegative Findings on the Investigations of Equine Infectious Anemia in the Marmara Region of Turkey. Turk J. Vet. Anim. Sci. 2002, 26: 299-302

Uysal, A., Bilal, T., Yılmaz, H., Arslan, M., Kayar, A., Meral, Y.: Comparative Studies on Some Blood and Serum Biochemical Values in Working Horses and Racing Horses. The Journal of the Faculty of Veterinary Medicine İstanbul Universty. 2001, 27 (1): 13-21

Ülgen, M., Seyrek-İntaş, K., Kocabıyık, L., Uzman, M.: Bacteriological Investigations on Horses with Infertility Problems. J Fac Vet Med., 2001, 20: 61-65

Vural, R., Çelebi, M., Yarım, M., Erdeğer, J., İzgür, H., Milli, Ü.H.: The Evaluation of Endometrium by using Ultrasonographic, cytologic, histopathologic and microbiologic methods in Infertil Purebred Arabian Mares in Vernal Transition Period. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1997, 44: 309-324

Vural, R., Yarım, M., Fındık, M., İzgür, H., Milli, Ü.H., Özdemir, T.: The Reproductive Performance in Maiden Sport Mares Left for Stud Duties: The Evaluation of the Endo metrium by using Ultrasonographic, Histopathologic and Microbiologic Methods. The Journal of The Faculty of Veterinary Medicine Universty of Ankara. 1998, 45: 273-286

Yurdaydın, N.: Karacabey harası yetiştirmesi safkan arap, safkan Haflinger ve yarımkan Haflinger kızgınlık ve kızgınlık siklusu süreleri ile dölverimi üzerinde araştırmalar.Ankara Üniv. Vet. Fak. Doktora Tezi, 1982

Yurdaydın,N., Pohl, W.: Değişik süre ve ısılarda çözülmüş donmuş aygır spermasının başlıca spermatolojik özellikleri üzerinde araştırmalar. Ankara Üniv. Vet. Fak. Derg. 1987, 34 (3): 477-485 (cited from Yurdaydın at all., 1989).

Yurdaydın, N., Sevinç, A., Wlader, W.: Değişik ırktan aygırların spermalarının dondurulması üzerinde araştırmalar. Ankara Üniv. Vet. Fak. Derg. 1986, 32 (3): 446-455 (cited from Yurdaydın at all., 1989).

Yurdaydın, N., Çelebi, M., Holzmann, A.: Untersuchungen zur Tiefgefrierkonservierung von hengstraperma. Lalahan Hay. Araşt. Enst. Derg. 1989, 29 (1-4): 98-106

Yurdaydın, N., Erdeğer, J., Tekin, N., Daşkın, A., Keskin, O., Klug, E.: Atlarda infertiliteye neden mikrofloranın saptanması. Etlik Vet. Mikrobiyoloji derg. 1992, 7: 93-107