

Review Article

PERIPARTURIENT EVENT AND DYSTOCIA IN EQUINE- A REVIEW

***A Thangamani¹, M Srinivas², B Chandra Prasad³ and L Phani Kumar⁴**

¹M.V.Sc Scholar, ² Professor, ³Assistant Professor, ⁴Teaching Assistant

Department of Veterinary Gynaecology and Obstetrics

NTR College of Veterinary Science, Gannavaram, Andhra Pradesh-521 102

Sri Venkateswara Veterinary University

E-mail: thangamtamil19@gmail.com (*Corresponding author)

Abstract: Equine species are unique in reproduction. Equines are long day seasonal breeder and parturition process that resembles closely in many ways to other domestic animals although some differences exist. The present review describes about signs of approaching parturition, fetal orientation during parturition, signs of dystocia and common forms of dystocia encountered in equines are described.

Keywords: Dystocia, Equine, Foetal orientation, Foetal maldisposition, Parturition.

INTRODUCTION

Equine species are long day seasonal breeder and parturition process that resembles closely in many ways to other domestic animals although some differences exist. The gestation period in the mare is about 340-350 days, may be deliver normally up to 380-385 days (Davis Morel et al., 2002). Some Through breed mare with quick fetal development may foal prior to 315-325 days (Hungerford, 1990; Davis Morel et al., 2002).

Signs of approaching Parturition: 1. Mare have the ability to exercise some control over the onset of parturition and most foals are born when stable activity is at minimum (Purohit et al., 1999), moreover at night hours foaling occurs. 2. In late gestation slight relaxation of *sacro-sciatic* ligaments occur as not as in cattle due to heavy *croup muscles*. 3. Udder started to develops last one to one and half months of gestation. 4. Mammary hypertrophy, tumefaction of teat and waxing of teat may be seen 24 -48hours before parturition in most mares, but not in all mares (Frazer et al., 1999a), in Through breed mare it noticed 4 hours before onset of parturition (Noakes et al., 2009). 5. Patchy sweating behind elbows and about the flanks and frequent urination is the best indication onset of first stage of labour in majority of the mares (Noakes et al., 2009), followed by the core body temperature becomes slightly sub-normal (36.5-37°C). 6. The end of the second stage indicated by crouching, straddling movement of the hind limbs, get down on sternum and rise again, seeing at flak region, followed by rupture of the chorio-allantoic membranes and flashing of urine like allantoic fluid from the ruptured

water bag. *Description of membranes:* The outer surface of the chorionic membrane is deep red in colour and has an appear as velvety whereas the amnion is opaque bluish white within that the fetal parts not clearly visible from outside as in cattle. 7. The onset of second stage of labour process occurs abruptly. It is characterized by appearance of the amniotic bag and commencement of vigorous straining, followed by very soon the mare goes down in right or left lateral recumbency and there is appearance of fetal leg or parts. One foal fetal leg is around 6 inches or 7-8 cm ahead of the second leg till the head of fetal born (Benesch and Wright, 2001). 8. Equine delivery is rapid and tremendous effort and delivery of foal, the mare remain lying on her side maximum up to 30 minutes. The fetal umbilical cord is intact when the foal is born. It may ruptures by the straining movement of mare or foal movement. 9. Generally third stage of labour (shedding of fetal membranes) completed within 3 hours.

Foetal Orientation during Parturition:

The equine fetal orientation during parturition appears to be a complex event. Jeffcott and Rossdale, (1979) reported that the full term equine fetus is initially lying in a dorso pubic position. Moreover the head, neck and forelimbs flexed posture. The increasing uterine tone during first stage of labour stimulates the fetus to extend its head and forelimbs, it can be described as "*Standing up in utero*" (Ginther, 1998). Moreover rupture of the chorio-allantois and gushing of the allantoic fluid does not occur until the fetlocks portion or knees are at the level of the external cervical opening (Frazer, 2001a). As labour progress the nose of the fetus reaches the vulva the cranial half of the fetus rotates from a *dorsopubic position* to *dorsoilial* position (Ginther, 1998). Finally the foal's withers continue to rotate into a dorso sacral position as the head appears through the vulvar lips, followed by the fetal pelvis rotates as the hips pass through the vulva (Frazer, 2001a). Axial rotations of 90° involving the cranial aspect of the fetus associated with head and neck postural changes, are common during late gestation period in the mare (Frazer, 2001a).

DYSTOCIA: Birth that causes maternal injury, requires assistance and reduces the neonatal viability is termed as dystocia (Purohit and Honnappagol, 2009). Equine dystocia gives challenging to the field and stud farm veterinary practitioners.

Compared to other domestic animal species, equine species are less prone for difficult delivery/ dystocia, but when it occurs it is considered as true emergency, because equines are precious species, where minute makes a difference in the survivability of the either fetus or mother (Norten et al., 2007; Wilkins, 2008), moreover foaling occur in night hours.

Signs of dystocia in equine: 1. Prolonged first stage of labour, 2. No progression in the second stage of labour even 20-30 minutes after rupture of chorio-allantoic membranes and release of fluids, 3. Increased severity of straining, 4. Absence of fetal parts in the vagina even after one hours of rupture of water bag, 5. No progress in straining, 6. not able to lie down, 7. Premature separation of the chorio-allantoic membranes (*Red bag condition*), 8. Comfortable first stage of labour, but failure in initiation of second stage of labour (*Uterine inertia*), 9. Continuous straining without any cervical discharges and fetal fluid discharge (*Incomplete cervical dilation, uterine torsion*).

Incidence of Dystocia:

Factor	Incidence	Reference
Age	Not related with age, but common in old mares	Frazer, (2007)
Sex of the fetus	More in mares with male fetuses than female	Jackson, (1995)
Parity	More in primiparous	Ginther and Williams, (1996); Ball, (2005)
Breed	Through breeds (4%) Belgian draught mare and Shetland ponies (10%)	Frazer, (2001a) Swendsen, (1989) Vandeplassche, (1992)
Difference within the species	Less frequency in Miniature pony mares, feral equids like Zebra	Neves et al., (2009) Kloppel, (1991)

CAUSES

Although the causes of dystocia in equine can be classified according to maternal and fetal associated origin, however, most records depict that fetal maldisposition (flexion of limbs and deviation of head) and obstruction of the birth canal (Uterine torsion) are most common cause of dystocia in equines (Frazer et al., 1997b; Chaney et al., 2007; Lopez and Carmona, 2010). Roberts, (2004); Threlfall, (2007) described the maternal and fetal cause of dystocia in equines. The present review, cause of dystocia have been discussed under the heading of *Maternal and Fetal causes*.

I. MATERNAL CAUSES

The maternal cause of dystocia in equine can be categorised as those because of defect or failure in abdominal expulsive forces and obstruction or obliteration of birth canal. The incidence of maternal cause of dystocia in mare is less than fetal cause of dystocia (Jackson, 2004).

Uterine inertia: In both mares and donkey mare this unusual condition is commonly reported. The mare is perfectly comfortable during first stage of labour with a completely

relaxed soft cervix, but does not initiate the second stage labour (Frazer et al., 1997b); some time it may be due to nervousness when disturbances occur during foaling (Jackson, 2004). Dropsical condition of the fetus also predisposes for secondary inertia due to exhaustion (Vandeplasche et al., 1976). Nervous mare should be left in a calm stall and undisturbed for 20 min or parturition can be induced with 2.5 to 15 IU of oxytocin given along with 1 liter saline slow IV drip would initiate uterine contraction within 15 to 20 minutes of administration without any complication (Youngquist, 1986; Jackson, 2004). Secondary inertia associated with fetal malposition cases, first should be correction of malposition followed by per vaginal delivery.

Failure of abdominal expulsive forces: Besides uterine inertia, the causes of failure of expulsive forces described for mare include, severe emaciation and abdominal hernia (Auer et al., 1985; Hanson and Todhunter, 1986), severe pain, old age and debility (Jackson, 2004). Moreover maternal dropsical condition also leads to retard the abdominal expulsive forces (Balanchard et al., 1987; Honnas et al., 1988). When any of these factors results in dystocia, it is usually necessary to deliver the foal through assistance either per vaginal or caesarean.

Obstruction of birth canal

a) Incomplete cervical dilation: Swendsen, (1989) reported that incomplete dilation of the cervix is sometimes encountered in the mares and donkey mares. Moreover in these species cervix can be manually dilated and poses little threat in dystocia management. Tocolytics are the choice of treatment for ICD condition in mares. β_2 adrenergics like Isoxsuprine hydrochloride 200-300 mg IM or IV or Clenbuterol 0.3 mg IV (Bostedt, 1988) may be given in animals whose cervix cannot be dilated by manual dilation.

b) uterine torsion: Uterine torsion is relatively uncommon in the equine species and accompanied by signs of severe discomfort like intestinal colic. It should be differentiated from other form of colic. It usually occurs in mares from eight and half months of gestation to term. predilection of cause for torsion is difficult. Chaney *et al.*, (2007) reported that less than 50% of torsions occur at parturition. Gestation completed at term uterine torsion led dystocia in 3.3% cases with uterine torsion occurring before the end of gestation in mares (Vasey, 1993).

Torsion of uterus must be suspected when signs of colic are seen in late gestation specifically at third trimester (Barber, 1979). The abdominal discomfort is mild in most cases, temporarily responsive after administration of analgesics. There is depression, anorexia, pawing, flank watching, kicking, and rolling it depicts that typical signs of colic. Mares may

show tachycardia, pyrexia and signs of depression (Doyle *et al.*, 2002). Per rectal examination indicated for diagnosis of side, site and degree of torsion. Perkins *et al.*, 1996 opined that careful palpation of uterine walls through per rectum must be done to identify uterine ruptures or tear, based on that findings proceed for manual or surgical management. Manual detorsion can be achieved by simple rotation (Youngquist, 1986) or some time Schaffer's method also advised (Bowen *et al.*, 1976). Standing flank laparotomy approach indicated for un correctable torsion.

c) Uterine rupture: In some time uterine torsion cases with severe straining culminate uterine rupture. Perkins *et al.*, 1996 opined that careful palpation of uterine walls through per rectum must be done to identify uterine ruptures or tear. This type of cases should be approached by standing plank laparotomy (Youngquist, 1986).

d) Deviation of uterus: ventral deviation of uterus may be noticed in cases of diaphragmatic hernia (Auer *et al.*, 1985) or rupture of prepubic tendon (Troedsson, 2007). The ventral abdomen of such mares must be supported by canvas straps (Frazer *et al.*, 1997b) and parturition initiated by hormonal treatment (Hanson and Todhunter, 1986). The prognosis of this type cases is poor to guarded and mares must be assisted during parturition or a caesarean section be performed and the mare should be removed from breeding programme (Jackson, 1995). Sometimes a mare may die shortly if the abdominal walls ruptures (Hanson and Todhunter, 1986; Brar *et al.*, 2007).

e) Other maternal causes: Birth canal may rarely obstructed by vaginal and cervical stricture, vaginal carcinoma, varicose vein, however rarely they impede the foaling in mare (Jackson, 2004; Frazer, 2007). Obstruction of pelvic inlet in pelvic fractures followed by excessive ossification (exostosis) is not common in mare and breeding should be avoided from such type of mares. Mares with varicose veins condition may bleed during foaling due to dilation of birth canal, the bleeding must be arrested by standard methods or sutured under general anaesthesia (Jackson, 1995).

II. FETAL CAUSES:

The fetal causes of dystocia in equine include fetal maldisposition (P_1 , P_2 , P_3) and fetal oversize. The most common fetal causes are fetal postural (P_3) abnormalities. The less frequently encountered fetal causes include fetal oversize, fetal monsters and fetal dropsical conditions (Allen, 1986; Waelchli and Ehrensperger, 1988; Bullard and Harrison, 1995).

A) *Foetal maldisposition:*

Fetal maldisposition is one of the major cause of dystocia in mares (Dugdale, 2007) accounting for about more than half of the dystocia cases.

Presentation abnormality (P₁) includes posterior presentation encountered about 1% of all equine birth (Dugdale, 2007), transverse presentation that includes ventro transverse presentation about 0.1% (Frazer et al., 1997b), ventro-vertical presentation (dog sitting posture) about 0.7% (Baldwin et al., 1991). Both three condition giving challenging to the equine obstetricians and complicated one due to bi-cornual pregnancy (Frazer et al., 2001a). Treatment of option includes most probably fetotomy and cesarean section (Youngquist, 1986) for this type of abnormal presentations.

Abnormal position (P₂) includes *dorsoilial* or *dorsopubic position* that culminate dystocia in posterior presentation mostly (Frazer et al., 1999b), because fetus fails rotates to *dorsosacral* position during foaling. Manually the abnormal position are corrected with help of ample quantity of lubrication.

Abnormal postures (P₃) includes lateral head deviation of head and neck appears to be preponderance cause of severe dystocia (Dadarwal et al., 2008; Frazer, 2009), Wry neck posture (Rice, 1994), deviation of head-vertex, nape and breast head posture (Youngquist, 1986, Frazer, 2001a), carpal flexion posture (Nahkashi et al., 2008), shoulder flexion-unilateral (Swimming posture) and bi-lateral (Diving posture) (Christensen, 2008), foot nape posture (Dugdale, 2007), hock flexion posture (Frazer et al., 1997b), breech presentation (Frazer et al., 1997b; Frazer et al., 2001a). Correction of posture: Epidural analgesia or general anaesthesia induced, followed by ample lubrication must be infused and fetus must be removed by obstetrical mutation procedure, difficult cases removed by either fetotomy or caesarean section (Youngquist, 1986).

B. *Foetal oversize:*

Fetal oversize is relatively not common in mares (Vandeplassche, 1993). However, breeding with males bigger than females or in some drought horses, foals with relative oversize can sometimes be born. Foals in transverse pregnancies are sometimes larger due increased space for fetal growth (Jackson, 1995). Prolonged gestation not always result in fetal oversize (Jackson, 1995).

Fetal congenital anomalies and monsters are rare in equine. However, hydrocephalus (Dugdale, 2007), *Schistosoma reflexus* (Dubbin et al., 1990; Ball, 2005), ankylosis of one or more limbs and wry neck are known to occur (Ball, 2005).

Fetomaternal disproportion (FMD) is not a common form of dystocia in equine about less than 2% (Frazer *et al.*, 1997). However, when feto-maternal disproportion occurs, it can be warranted caesarean section or fetotomy procedure. Foetal oversize condition managed by depending upon the size of the fetus by mutation, fetotomy and cesarean section (Youngquist, 1986).

Conclusion

Mammary hypertrophy, tumefaction of teat and waxing of teat may be seen 24 -48hours before parturition in most mares considered as imminent signs of parturition. Full term equine fetus is initially lying in a dorso pubic position. Moreover the head, neck and forelimbs flexed posture. Compared to other domestic animal species, equine species are less prone for difficult delivery/ dystocia, but when it occurs it is considered as true emergency. Most records depict that fetal maldisposition (flexion of limbs and deviation of head) and obstruction of the birth canal (Uterine torsion) are most common cause of dystocia in equines. Early intervention may save the mare and foal life.

References

- [1] Allen, E.W. (1986). Two cases of abnormal equine pregnancy associated with excess fetal fluid. *Equine Vet J* 18: 220-22
- [2] Auer, D.E., Wilson, R.G., Groenendyk, S., Kalhor, A., Wilson, R.P. (1985). Diaphragmatic rupture in a mare at parturition *Equine Vet J* 17: 331-33
- [3] Baldwin, J.L., Cooper, W.L., Vanderwall, D.K. (1991). Dystocia due to anterior presentation with unilateral or bilateral hip flexion posture (dog sitting presentation) in the mare. Incidence management and outcomes. In: *Proc 37th Annual Meet Am Assoc Eq Pract* 229-240.
- [4] Ball, B.A. (2005). Dystocia in the mare: Management and decision making. *Proc Annu Meet Italian Assoc Equine Vet pisa* p1-4 Italy.
- [5] Barber, S.M. (1979). Torsion of the uterus- a cause of colic in the mare. *Can Vet J* 20:165-7
- [6] Benesch, F., Wriht, t J.G. (2001). *Veterinary Obstetrics*. Greenworld Publishers, Lucknow, India.
- [7] Blanchard, T.L., Varner, D.D., Buonanno, A.M., Palmer, J.E., Hansen, T.O., Divers, T.J. (1987). Hydroallantois in two mares. *J Equine Vet Sci* 7:355.
- [8] Bostedt, H. (1988). Use of beta 2 mimetic agent (clenbuterol) in equine pregnancy disorders and obstetrics. *Tierarztl Prax* 16: 57-59.

- [9] Bowen, J.M., Gaboury, C., Bousquet, D. (1976). Non –surgical correction of a uterine torsion in the mare. *Vet Rec* 99:495-96.
- [10] Brar, P.S., Singh, H., Prabhaker, S. (2007). Rupture of prepubic tendon and ventral abdominal wall in a pregnant mare. *Indian J Anim Reprod* 28:94-95.
- [11] Bullard, K.M., Harrison., M.R. (1995). Before the horse is out of the born: fetal surgery for hydrops. *Semin Perinatol* 19:462-73.
- [12] Chaney, K.P., Holcombe, S.J., Le Blanc, M.M., Hauptman, J.G., Embertson, R.M., Mueller, P.O.E., Beard, W.L. (2007). The effect of uterine torsion on mare and foal survival: a retrospective study, 1985-2005. *Equine Vet J* 39: 33-6.
- [13] Christensen, B. (2008). Managing dystocia in the mare. *Proc Central Vet Conf Baltimore* P 1-5.
- [14] Dadarwal, D., Honparkhe, M., Dhaliwal, G.S. (2008). Dystocia in mare due to lateral deviation of head in congenitally deformed foal. *Indian J Anim Reprod* 29: 228-29.
- [15] Davis Morel, M.C., New, J.R., Holland, S.J. (2002). Factors affecting gestation length in the thoroughbred mare *Anim Reprod Sci* 74: 175-185.
- [16] Doyle, A.J., Freeman, D.E., Sauberli, D.S., Hammock, P.D., Lock, T.F., Rotting, A.K. (2002). Clinical signs and treatment of uterine torsion in two mares. *J Am Vet Med Assoc* 220:349-53.
- [17] Dubbin, E.S., Welker, F.H., Veit, H.P., Mondransky, P.D., Talley, M.R. (1990). Dystocia attributable to a fetal monster resembling schistosomus reflex in a donkey. *J Am Vet Med Assoc* 197: 605-7.
- [18] Dugdale, D.J. (2007). Dystocia. *BEWA Equine Stud Medicine Course* p 225-28.
- [19] Frazer, G.S. (1997). Review of the use of fetotomy to resolve dystocia in the mare. *Proc Am Assoc Equine Vet Pract* 43: 262-268.
- [19] Frazer, G.S., Perkins, N.R., Blanchard, T.L., Lock, T.F., Sertich, P.L., Baker, G.J, Vaala, W.E. (1997b). Prevalence of fetal maldispositions in equine referral hospital dystocias. *Equine Vet J* 29: 111-116
- [20] Frazer, G.S., Embertson, R., Perkins, N.R. (1997a). Complications of late gestation in the mare. *Equine Vet Educ* 9:306-311
- [21] Frazer, G.S. (2001). Obstetrics. In: *Recent advances in equine reproduction*. Ed. Ball B.A. International Vet. Information Service (www.ivis.org)A 0208-0501
- [22] Frazer, G.S. (2007). Dystocia and Fetotomy. In: *Samper JC, Pycock JF, Mc Kinnon AO eds Current Therapy in Equine Reproduction*. Saunders Elsevier. Missouri p 417-34.

- [23] Frazer, G.S. (2009). Dystocia management on the farm. 15th SIVE Congress Proc Annu Meet Italian Assoc Equine Vet p 57-59.
- [24] Ginther, O.J. (1998). Equine pregnancy: Physical interactions between the uterus and conceptus. In: Proc. 44th Annual Meet Am Assoc Eq Pract 73-104.
- [25] Ginther, O.J., Williams, D. (1996). On the farm incidence and nature of equine dystocias. *J Eq Vet Sci* 16: 159-164.
- [26] Hanson, R.R., Jodhunter, R.J (1986). Herniation of the abdominal wall in pregnant mares. *J Am Vet Med Assoc* 189: 790-93.
- [27] Honnas, C.M., Spensley, M.S., Lavery, S., Blanchard, P.C. (1988). Hydramnios causing uterine rupture in a mare. *J Am Vet Med Assoc* 193: 334-36.
- [28] Hungerford, T.G. (1990). *Diseases of Livestock*, McGraw Hill book Company, Sydney.
- [29] Jackson, P.G.G. (1995). *Handbook of Veterinary Obstetrics*, W.B. Saunders Co., London, U.K.
- [30] Jackson, P.G.G. (2004). *Handbook of Veterinary Obstetrics* 2nd ed Saunders Elsevier Missouri.
- [31] Jeffcott, L.B., Rosedale, P.D. (1979). A radiographic study of fetus in late pregnancy and during foaling. *J Reprod Fert Suppl* 27: 563-569.
- [32] Kloppel, R. (1991). Dystocia in a Grevy's Zebra. *Berl Munch Tierarztl Wochenschr* 104: 26-27.
- [33] Lopez, C., Carmona, J.U. (2010). Uterine torsion diagnosed in a mare at 515 days gestation. *Equine Vet Edu* 22: 483-86.
- [34] Maxwell, J.A. (1979) The correction of uterine torsion in a mare by cesarean section. *Austr Vet J* 55: 33-34.
- [35] Nahkashi, H.C., Suthar, B.N., Patel, R.M. (2008). Fetal dystocia in mare- case reports. *Intas Polivet* 9: 86-88.
- [36] Neves, A.P., Fiala, S.M., Filo, I.C.B., Linden, L.S. (2009). Some considerations on dystocia in miniature pony mares. Proc 11th International Congress World Equine Vet Assoc. Guarija Brazil P-7.
- [37] Noakes, D.E., Parkinson, D.J. and England, G.C.W. (2009). Maternal dystocias. *Arthurs veterinary reproduction and obstetrics*, (Ed.) Noakes D E. Saunders Harcourt, India
- [38] Norton, J.L., Dallap, B.L., Johnston, J.K., Palmer, J.E., Certich, B.L., Boston, R., Wilkins, P.A. (2007). Retrospective study of dystocia in a mare at a referral hospital. *Equine Vet J* 39: 37-41.

- [39] Perkins, N.R., Hardy, J., Frazer, G.S., Threlfall, W.R. (1996). Theriogenology question of the month. Transrectal palpation used to diagnose uterine torsion in a horse. *J Am Vet Med Assoc* 209:1395-96.
- [40] Purohit, G.N, Hannappagol, S.S. (2009). Dystocia and its management in mares. In: Eds Suresh SK, Tandle MK. *Veterinary Obstetrics A Practical Guide*. Jaypee Brothers Medical Publishers New Delhi p 89-98.
- [41] Purohit, G.N., Sharma, B.S., Gupta, K.A. (1999). Reproductive performance in mares. *Indian J Anim Sci* 69: 398-399.
- [42] Rice, L.E. (1994). Dystocia- related risk factors. *Vet Clin North Am Food Anim Pract* 10: 53-68.
- [43] Riddle, W.T. (2003). Preparation of the mare for normal parturition. 49th Annual Convention of the American Association of Equine Practitioners. New Orleans. Louisiana (www.vivis.org) P.0601-1103.
- [44] Roberts, S.J. (2004). *Veterinary Obstetrics and Genital Diseases*. 3rd Ed. Indian ed CBS Publishers, New Delhi, India. Pp. 277-352.
- [45] Swendsen, D.E. (1989). *The professional handbook of the donkey*. Sovereign printing group, England.
- [46] Threlfall, W.R. (2007), Parturition and dystocia. In: Youngquist RS, Threlfall WR eds. *Current Therapy in Large Animal Theriogenology* 2nd edition Missouri Saunders Elsevier p 118-30.
- [47] Troedsson. M.H.T. (2007). High risk pregnant mare. *Acta Vet Scand* 49 (Suppl 1). 51 – 59.
- [48] Vandeplassche, M., Bouters, R., Spincemaille, J., Bonte, P.(1976). Dropsy of the fetal sacs in mare: induced and spontaneous abortion. *Vet Rec* 99: 67-69.
- [49] Vandeplassche, M. (1992). Selected topics in equine obstetrics. In: *Proceedings of the 38th Annual Meet Amer Assoc Eq Pract* pp. 623-628.
- [50] Vandeplassche, M. (1993). Dystocia. In: *Equine Reproduction*. Eds. McKinnon A, Voss J; Lea and Febriger, Philadelphia. Pp. 578-587.
- [51] Vasey, J. (1993). Uterine torsion In: Mc Kinnon, Joss JL.eds *Equine Reproduction* Phildephia Williams and Wilkins pp 456-460.
- [52] Waelchi, R.O., Ehrensperver, F. (1988). Two related cases of cerebellar abnormalities in equine fetuses associated with hydrops of fetal membranes. *Vet Rec* 123: 513-14.

[53] Wilkins, P.A. (2008). Dystocia: A true emergency of the horse. Proc Eur Equine Meeting XIV SIVE/FEEVA Congress Venice Italy p 285-289.

[54] Youngquist, R.S. (1986). Equine obstetrics In: Current Therapy in Theriogenology. Ed. Morrow. D.A. W.B. Saunders Co. Philadelphia, U.S.A.