



ELSEVIER

Animal Reproduction Science 94 (2006) 411–412

ANIMAL
REPRODUCTION
SCIENCE

www.elsevier.com/locate/anireprosci

Abstract

Stereology in the term placenta of the donkey, Thoroughbred and pony: A comparative study[☆]

M. Villani^{a,*}, S. Wilsher^b, A. Carluccio^c, A. Contri^c, M.C. Veronesi^a

^a *Dipartimento di Scienze Cliniche Veterinarie, Sez. Clinica Ostetrica e Ginecologica Veterinaria, University of Milan, Italy*

^b *Department of Veterinary Medicine Equine Fertility Unit, University of Cambridge, Newmarket, Suffolk, UK*

^c *Dipartimento di Scienze Cliniche Veterinarie, Sez. Ostetricia-Ginecologia e Riproduzione Animale, University of Teramo, Italy*

Available online 25 April 2006

1. Introduction

The equine placenta is diffuse, epitheliochorial and microcotyledonary. There have been a number of studies on the horse placenta but comparatively little is known about the donkey placenta. Therefore, the aim of the present study was to compare horse and donkey placentae using stereological techniques.

2. Materials and methods

Term placentae were collected at spontaneous foaling from seven Thoroughbred mares, seven pony mares and six jennies. All the animals had undergone a normal pregnancy and uncomplicated parturition. Each foal was weighed within 30 min of birth. The allantochorion was weighed and the gross area measured. In addition, 10 random biopsies were recovered using a random sampling method and processed for light microscopy. The volume and thickness of the allantochorion were also determined. The surface density of the microcotyledons (S_V ; surface area per unit volume) was calculated using a computer software package and the volume of the chorion (V_C) was estimated using Cavalieri's principle. The total microscopic area of fetomaternal contact (A_{fm})

[☆] This paper is part of the special issue entitled Proceedings of the Ninth International Symposium on Equine Reproduction, Guest Edited by Margaret J. Evans.

* Corresponding author at: Dipartimento di Scienze Cliniche Veterinarie, Sez. Clinica Ostetrica e Ginecologica Veterinaria, via Celoria 10, 20133 Milano, Italy.

E-mail address: marta.villani@unimi.it (M. Villani).

was calculated by multiplying the mean S_v value for each placenta by the V_c . Placental efficiency was estimated by considering newborn weight supported per m^2 of A_{fm} .

3. Results

Gestation length (mean \pm S.D.) was longer in the donkeys compared to the other two groups (369 ± 9 days versus 332 ± 8 days, $P < 0.05$). When considering all the placentae significant correlations were exhibited between foal birth weight and gross area ($r^2 = 0.76$; $n = 20$; $P < 0.05$), mass ($r^2 = 0.83$; $n = 20$; $P < 0.05$) and volume ($r^2 = 0.88$; $n = 20$; $P < 0.05$) of the allantochorion. The S_v was significantly higher in the donkey placenta than the other groups ($0.050 \pm 0.001 \mu\text{m}^{-1}$ versus $0.033 \pm 0.002 \mu\text{m}^{-1}$, $P < 0.05$). Consequently, the A_{fm} was significantly higher in the donkeys than the ponies despite similarities in maternal and newborn weights in these two groups. Placental efficiency was lower in the donkeys than the other groups ($0.87 \pm 0.14 \text{ kg/m}^2$ versus $1.29 \pm 0.20 \text{ kg/m}^2$, $P < 0.05$). For all the placentae a positive correlation existed between S_v and gestational length ($r^2 = 0.88$; $n = 20$; $P < 0.05$). Placental efficiency was negatively correlated to S_v ($r^2 = 0.62$; $n = 20$; $P < 0.05$).

4. Discussion

The results of this study confirm that strong similarities exist between placentae from different equine species. The complex branching pattern of the donkey microcotyledons could be a consequence of the increased gestation length, as hyperplastic villi develop in prolonged human pregnancies. The finding of a reduction in placental efficiency in the donkey was not unexpected since placental efficiency has been shown to be negatively correlated with increasing complexity of the microcotyledons. Furthermore, in the pig variations in placental efficiency have been reported between species within the genus.