

Age related and geographical factors affecting fertility and pregnancy in the mare

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Abstract

Forty years ago a failure of significant numbers of maiden, barren and lactating mares to be covered advantageously due to their unwillingness to cycle and ovulate normally during the confines of the arbitrary and out-of-phase Thoroughbred 'covering season' (mid-Feb to mid-June), combined with later stage abortion of undiagnosed twin pregnancies, were probably the major factors acting to reduce fertility in this breed. Subsequent development and judicious studfarm veterinary application of drugs like prostaglandin, altrenogest and other progestagen formulations, gonadotrophin-releasing hormone (GnRH) analogues, domperidone and long-acting depot formulations of steroid hormones, together with diagnostic techniques such as the rapid ELISA assay kit for progesterone and transrectal ultrasonography for the accurate monitoring of follicular growth, early diagnosis of singleton and twin pregnancy and detection of accumulated fluid and other uterine pathology, have virtually eliminated these original 'fertility blockers' in Thoroughbred mares and in non-Thoroughbred competition horses. The improvements have helped greatly to lift present day 'diagnosable' pregnancy rates (i.e. >day 12 after ovulation) to >90% per season. Yet some 15% of mares still lose one or more pregnancies each season and around 25% of these losses occur during the second half of gestation. Why? And why are so many foals born maladjusted, dysmature or disfigured to the extent that they never perform successfully as athletes?

The rates of both early and late pregnancy loss climb steeply with increasing mare age in which, as described originally by the late Professor Bob Kenny and confirmed subsequently by Verena Bracher of Switzerland and Heinz Schoon and his colleagues in Leipzig, degenerative changes occur in both the morphology and secretory functions of the ageing endometrium, including fibrous deposition within the stroma and around the endometrial glands. The former obstructs fluid drainage from the endometrium via the lymph channels and the latter leads to non-functional 'gland-nest' formation, thereby reducing both the production of nutrient histotroph and the ability of the endometrium to re-model itself to accommodate the attachment and interdigitation needs of the developing epitheliochorial placenta. Just as in twin pregnancy the fetus suffers varying degrees of nutritional deprivation giving rise to dysmature, poorly muscled and long coated foals born well after term or, in the worst case scenario, aborted in later gestation. Along similar lines, and as mooted recently by Sandra Wilsher, failure of the allantochorion to expand the uterus sufficiently, perhaps due to inadequate fluid transport within and through the placenta, may underlie the common occurrence of flexural limb deformities ('contracted tendons') in Thoroughbred neonates.

Excessive twisting, leading to vascular occlusion, of the umbilical cord, is perhaps the principal cause of non-infectious mid- to late-stage abortion in Thoroughbred mares in the UK but, curiously, not in America. The question of what induces the fetus to rotate so vigorously in its bath of fluids earlier in gestation remains unsolved. Conversely, placentitis of bacterial or fungal cause, occurs more commonly in America than Britain. Ascending placentitis appears relatively straightforward and it has its origin usually in some degree of cervical incompetence. So-called nocardioform placentitis, on the other hand, which is patchy in its distribution on the placenta and is clearly unrelated to the cervix, is much more intriguing. Its apparently limited occurrence to Eastern USA and North-eastern Australia where the setae-covered, respectively, Eastern Tent and Processionary caterpillars flourish, begs the question as to whether bacteria-carrying setae shed from ingested caterpillars passing through the walls of the intestine and closely adjacent uterus, as demonstrated to occur by Judy Cawdell-Smith and co-workers in Australia, may be the crucial etiological factor in the nocardioform placentitis phenomenon. Perhaps the terrible MRLS abortion storm of 2001/2002 in Eastern Kentucky is not over yet and the occurrence of abortion versus focal placentitis is merely a matter of the challenge dose of caterpillar setae.

In summary, although technological advances in recent years have enabled great strides in achieving conception in Thoroughbred and other types of competition mares it is probably true to say that, with the notable exception of twins, the rates of pregnancy loss, both early and late, have continued unchanged, or may even have increased slightly, during the same period. Clearly, more research needs to be done to lessen this continuing problem in equine stud management.

