

Social interactions and reproductive efficiency in horses

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The reproductive efficiency of domesticated horses is often lower than what could be expected from observations in feral herds where stallions typically live with mares in harem bands, with other stallions in bachelor bands, or occasionally in mixed sex transitional bands. Modern husbandry, breeding procedures and structures of domesticated horses differ greatly from natural conditions. Contrary to almost year-round contact with mares in feral conditions, domesticated stallions are often kept isolated from mares and other horses, with collection for semen carried out using a phantom and artificial vagina or via “in hand” service. This modern breeding industry has resulted in a wide disparity between the sexual behaviour of domesticated horses in comparison with their feral counterparts, where mate choice systems have evolved in natural conditions.

In effect, in most mammal species, mate choice is carried out by females which have to be “choosy” as they usually invest the most concerning reproduction and parental investment and are therefore often the limiting sex. Such seems also to be the case in horses, where pre-copulatory mate choice of females may be based on the good genes model which follows the principal that females will choose males based on certain traits / phenotypes which can be strong indicators of the male’s genotype. This in turn will convey indirect benefits for females such as the optimization of offspring fitness. Selection of a partner may also be based on a complementary mate choice model where individuals should choose genetically different mates that will minimize inbreeding depression of their offspring.

We recently demonstrated that stallions’ perception of mare quality can affect their life-history and lead to some form of “strategic ejaculation”. Sperm production is costly and therefore males are expected to invest more sperm for a higher quality female. Post-copulatory selection may potentially also occur via “cryptic selection” within the female reproductive tract, perhaps enabling females to avoid inbreeding effects or bias offspring variability. Such interactions are likely to be influenced by various factors, including the highly polymorphic genes of the major histocompatibility complex (MHC) that have been shown to influence odours and mate preferences in a range of vertebrates. Typically, males and females will avoid MHC-similar mates which may either aim to directly promote MHC heterozygosity or use the diversity on the MHC as a marker to increase overall heterozygosity in offspring, i.e. avoiding inbreeding and/or providing an immunological advantage for the progeny. Such complex selection factors show the importance of the influences of social communication directly impacting reproductive efficiency and success.

A better understanding of the effects of intra- and intersexual social interactions between stallions and mares on their breeding efficiency provides potentially valuable information, which could be implemented for future optimization of breeding management. We provide here a summary of our research on reproductive strategies in horses, potentially leading to higher fertility and biodiversity.

References

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