

# Anovulatory Hemorrhagic Follicles

also known as "Autumn Follicles" or "Persistent Anovulatory Follicles"

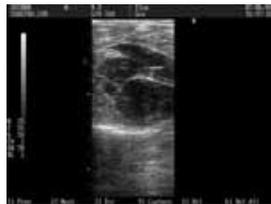
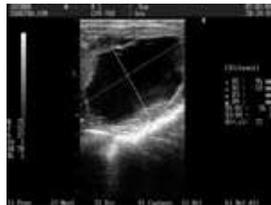
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<http://www.Equine-Reproduction.com>

Normally Developing



Full size images available on line at  
<http://www.equine-reproduction.com/articles/AHF.shtml>.

Developing Specks  
and Strands



You're following a mare's follicular development using ultrasound prior to breeding, and are relieved to see a good sized follicle developing.

Unusually, the follicle continues to develop beyond the size at which you normally see ovulation occurring in this mare, and the development seems to continue for an inordinate amount of time. If using transported cooled semen, you may call for a shipment and inseminate at least once, possibly twice, anticipating ovulation, but then something strange seems to be happening to the follicle when being viewed using ultrasound. Not only has it not ovulated, but it appears to have stopped getting larger, and is now starting to develop white specks within the dark follicular fluid.... *What is going on?*

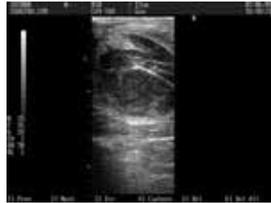
In all likelihood, you are seeing a condition known as a "persistent anovulatory follicle" (PAF), also termed an "anovulatory hemorrhagic follicle" (AHF) or an "autumn follicle".

It is unclear exactly what causes this problem, but suggested possibilities include low follicular estrogen levels<sup>1</sup>; insufficient gonadotropin stimulation (which can result in low follicle stimulating hormone - FSH - and/or luteinizing hormone - LH - levels)<sup>2</sup>; or hemorrhage into the interior (lumen) of the follicle<sup>3</sup>. There has been a degree of correlation between those animals that have received hCG or GnRH in an attempt to stimulate ovulation, but it should be noted that the condition will also develop in mares that have not received either stimulatory drug, nor is the incidence significantly high enough to be considered enough of a problem to prevent giving the drugs at all. The incidence of PAF's is also more common in the transitional phases of the year - both spring and fall, hence the name "autumn follicles" - as well as in older mares.

The specks that appear on ultrasound are thought to be initially blood, and the subsequent strands fibrinous. PAF's have been shown as occurring in

over 8% of estrous cycles in a recent study <sup>4</sup> with age differentials recorded as below, and an overall recurrence of 43.5% in the same breeding season.

6-10 years old	16-20 years old	mean age of PAF mares
4.4%	13.1%	15.4 +/- 5.5 years



The frustrating aspect of these PAF's is that they are not fertile (as there is no ovulation), so the cycle on which they occur is lost, and many also result in a delay in return to subsequent estrus, so future breeding may also be delayed. About 85% of PAF's do develop luteal tissue (which is the tissue that becomes present when a mare normally ovulates, that luteal tissue being contained within the corpus luteum or "CL") which is evidenced by the follicle showing a fully anechoic appearance on ultrasound, and elevated levels (>1 ng/ml) of progesterone. These may respond to treatment and resolve if a luteolytic dose of prostaglandin F2a is given. The remaining 15% however, which retain an anechoic appearance on ultrasound, will remain *in situ* despite all attempts to dislodge them - in some instances for as long as 100 days.

For years, the presence of a condition known as "cystic follicles" in the cow has been considered to be absent in horses, although there have been occasional incidences of such a diagnosis being made. The recently released research performed at Colorado State University <sup>4</sup> suggests that there is a distinct correlation between the anechoic equine PAF and follicular cysts in cattle, and the echoic equine PAF and bovine luteal cysts, and that perhaps the previous beliefs should be reconsidered.

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## References

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- 2: **McKinnon AO**. Ovarian abnormalities. In: Ranaten NW, McKinnon AO, editors. Equine diagnostic ultrasonography. Baltimore: Williams and Wilkins, 1997. p 233-51.
- 3: **Ginther OJ**. Reproductive biology of the mare. Basic and applied aspects. Cross Plains, WI: Equiservices, 1992.
- 4: **McCue PM, Squires EL**. Persistent anovulatory follicles in the mare. Theriogenology 58 (2002) 541-543.

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