

# **I gave my mare Prostaglandin, but it didn't work!**

By Jos Mottershead

Prostaglandin F2 $\alpha$  is commonly used in the mare to cause her to enter estrus (come in to “heat”). It does this by destroying a structure that forms on the ovary following ovulation called the Corpus Luteum (“CL”) <sup>1</sup>. The CL secretes the hormone progesterone, which prevents the mare from displaying receptivity to a stallion. This destructive process may seem a little radical, but in fact the mare herself will secrete prostaglandin F2 $\alpha$  from her endometrium (the lining of the uterus) about 14 days after her previous ovulation if she is not pregnant <sup>2</sup> with the same effect – destruction of the CL (called “luteolysis”), and a resulting return to estrus.

From the above, we can clearly see that for prostaglandin F2 $\alpha$  to bring a mare back into heat, there must be a CL present on the ovary that is receptive to the action. Such a CL will typically only be present at least 5 days after an ovulation has occurred. In other words, the administration of prostaglandin F2 $\alpha$  sooner than 5 days after an ovulation, or in the absence of an ovulation (such as during transitional phase before the first ovulation of the year) will not result in a return to estrus.

It would seem reasonable then, that we should detect an ovulation on a prior cycle, count to at least day 6, give the prostaglandin F2 $\alpha$  and then expect to see the mare come back into estrus, right? Wrong!

Mares have the ability to develop follicles, and indeed ovulate follicles, in the face of elevated progesterone levels – i.e. during diestrus (the time in between “heat”) or pregnancy. This is perfectly normal, and although not seen in all mares, can lead to a failure of timely luteolysis, and – consequently – no return to estrus. In other words, even if you have faithfully counted the requisite 6 days from the previously identified ovulation, but the mare has recently ovulated a second (undetected) follicle, the prostaglandin F2 $\alpha$  will not cause the mare to return to estrus.

The next issue that can cause problems when using prostaglandin F2 $\alpha$  in an attempt to induce estrus is that – assuming there is a receptive CL present – the duration to the onset of estrus will be significantly impacted by the size of the follicles present on the ovaries at the time of treatment <sup>3</sup>. If a follicle >3 cm is present at the time the prostaglandin F2 $\alpha$  is administered, ovulation may occur in as little as 2-4 days <sup>4,5</sup> (and occasionally less), whereas if the follicles are <3 cm, ovulation will usually occur about 9.5 days after treatment <sup>6</sup>. Another possible problem to be faced when dealing with a mare with a >3 cm follicle present is that in some cases, there will not be a rapid onset of estrus and ovulation, but rather a regression of the follicle, with a delayed onset of estrus.

It should also be noted that the use of prostaglandin F2 $\alpha$  in mares with a >3 cm follicle present has also been linked to a reduced (50% of the second group) embryo recovery rate when compared to those mares treated with <3 cm follicles present <sup>6</sup>.

While the use of prostaglandin F2 $\alpha$  may be an easy way to induce estrus, it is not without considerable complications that are often not understood and which can result in failure. In order to successfully induce a timely estrus, it is therefore essential to be fully conversant with what structures are present on the mare's ovaries at the time of treatment, and how large they are. It is of course equally essential to treat the mare in a manner suitable based upon those findings.

### **Summary:**

- For success, the mare cannot be in a state of anestrus (winter or otherwise), or still in transitional phase (i.e. prior to the first ovulation of the year);
- For prostaglandin F2 $\alpha$  to induce estrus, there must be a fully functional CL present;
  - This is generally achieved by making sure the previous ovulation occurred at least 6 days prior to treatment.
- There cannot have been a recent (<6 days), possibly undetected ovulation;
- Follicles – if present – should be <3cm in diameter (and preferably <2 cm);
- If the onset of estrus occurs rapidly, it is likely that ovulation will also occur rapidly.
  - Teasing should be started the day of, or the day after, administration of prostaglandin F2 $\alpha$ , with immediate breeding if a rapid onset of estrus is detected.
- If prostaglandin F2 $\alpha$  is given to a mare with follicles >3 cm, the resulting pregnancy rate will be decreased.

### **Note:**

Commercial brand-name prostaglandin F2 $\alpha$  or prostaglandin F2 $\alpha$  analogue products include:

Lutalyse (*Pharmacia & Upjohn Company, Kalamazoo, MI*)

Prostamate (*Phoenix Pharmaceutical, Inc St. Joseph, MO*)

Prostin (*Pharmacia & Upjohn Company, Kalamazoo, MI*)

Estrumate (Schering-Plough Corporation Kenilworth, NJ) not labeled for use in horses.

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### **References:**

<sup>1</sup> Silvia WJ, Lewis GS, McCracken JA, Thatcher WW, Wilson JR. Review: hormonal regulation of uterine secretion of prostaglandin F2 $\alpha$  during luteolysis in ruminants. *Biol. Reprod.* 1991; 45:655-63

<sup>2</sup> Douglas, RH, Ginther, OJ. Concentration of prostaglandin F in uterine venous plasma of anaesthetised mares during estrous cycle and early pregnancy. *Prostaglandins* 1976; 11:251-60

<sup>3</sup> Loy RG, Buell JR, Stevenson W, Hamm D. Sources of variation in response intervals after prostaglandin treatment in mares with functional corpora lutea. *J Reprod. Fertil. Suppl.* 1979; 27:229-35

<sup>4</sup> Kiefer BL, Roser JF, Evans JW, Neely DP, Pachero CA. Progesterone patterns observed with multiple injections of a PGF-2 alpha analogue in the cyclic mare. *J Reprod. Fertil. Suppl.* 1979; 27:237-44

<sup>5</sup> Personal observation

<sup>6</sup> Lindenburg H, Koskinen E, Huhtinen M, Reilas T, Perttula H, Katila T. Influence of PG administration and follicle status on the number of conceptuses.