

ADMINISTRATION OF TWO ESTROUS SYNCHRONIZATION PROTOCOLS IN HIGH-YIELDING DAIRY COWS

INTRODUCTION

The estrous synchronization consists on modifying females' estrous cycles with one or more hormones to bring cattle into estrous (heat) within a short period of time. Estrous synchronization is important to conveniently time the breeding of cattle in artificial insemination and embryo transfer.

OBJECTIVE

The aim of this paper is to analyze and compare the conception rate of two estrous synchronization protocols applied to repeat breeding cows during 2016, in a farm with 875 high production dairy cows situated in Osona.

ESTROUS CYCLE

Estrous cycle is the period comprised between two heats and controlled by gonadal hypothalamic-hypophysis axis (Fig.1). In bovine, estrous cycle lasts for 21 days and it includes a follicular phase (Proestrous, Estrous) and a luteal phase (Metestrous, Diestrous).

In cattle, follicles develop in wave-like patterns (Fig. 2). Following ovulation, circulating concentrations of FSH (follicle stimulating hormone) increase. This increase in FSH causes the recruitment of a group of follicles at the beginning of each follicular wave. Then, a selected follicle becomes the dominant one, inhibiting the growth of any other follicles. In the absence of progesterone, the dominant follicle will ovulate following standing estrus. In the presence of progesterone the dominant follicle will not ovulate, will undergo atresia (cell death), and a new follicular wave will be initiated. Cattle usually have 2 or 3 follicular waves during each estrous cycle.

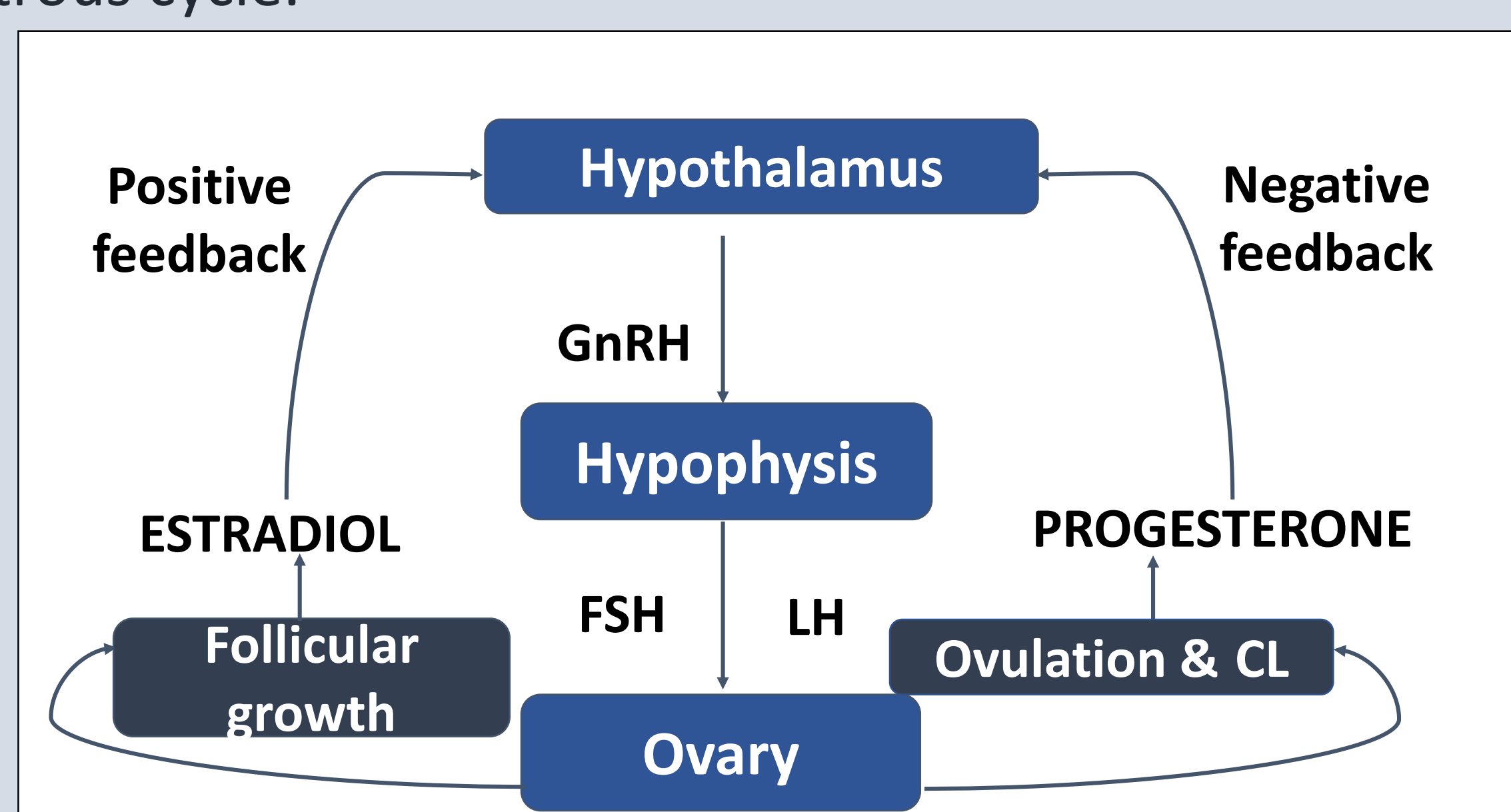


Fig. 1 The gonadal hypothalamic-hypophysis axis. *Gonadotropin-releasing hormone (GnRH), Follicle stimulating hormone (FSH, Luteinizing hormone (LH), Corpus luteum (CL).*

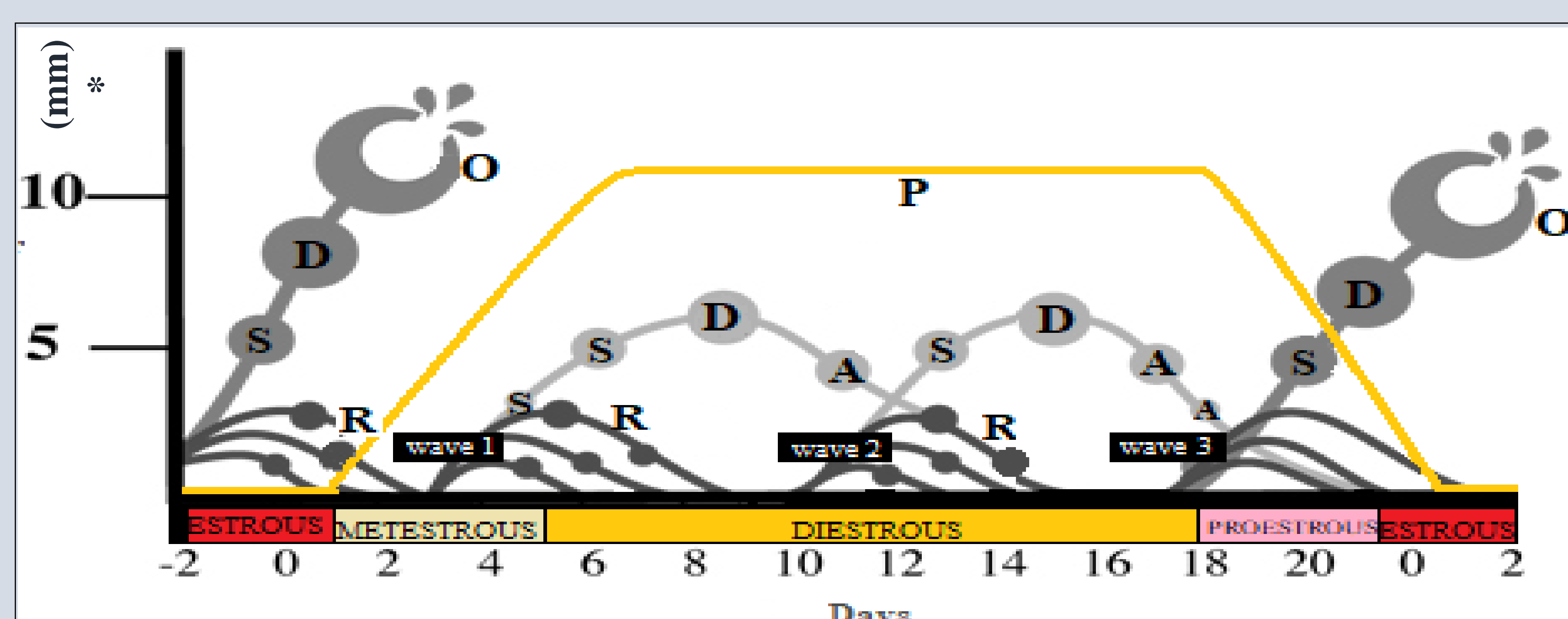


Fig. 2 Follicular waves and structures during the cow's estrous cycle. Day 0= day of the heat. Recruitment (R), Selection (S), Dominance (D), Atresia (A), Progesterone (P). *Follicular diameter.

MATERIAL AND METHODS

The two protocols were administrated to repeat breeding cows and they consist on the administration of:

- **GnRH (gonadotropin-releasing hormone):** it causes follicle turnover and new follicle development in presence of progesterone. It induces a follicle to ovulate when concentrations of progesterone decrease.
- **PGF2α (F2α prostaglandin) :** it induces regression of corpus luteum.

The only difference between both protocols is the addition of a second administration of PGF2α to guarantee the lysis of the corpus luteum.

A total of 471 artificial inseminations were evaluated: 108 using GPG, 243 using GPPG and 120 without synchronization (control).

GPG (GnRH-Prostaglandin-GnRH): between 80 and 283 DIM.

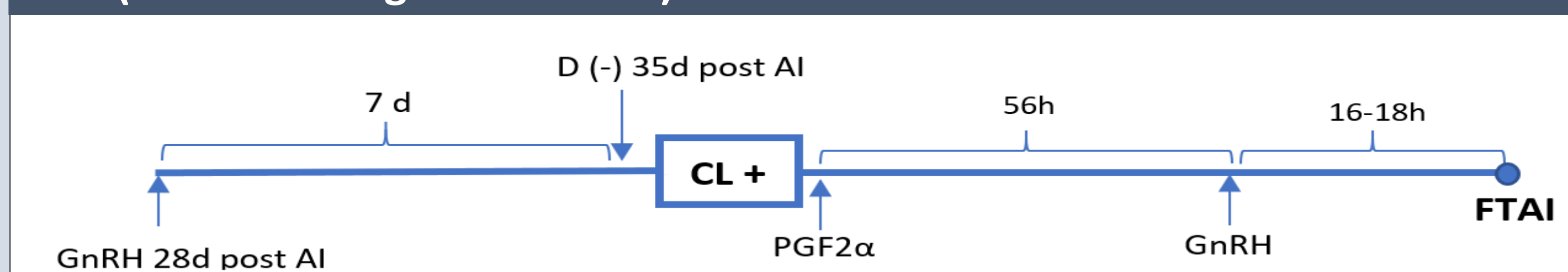


Fig. 3 Schematic diagram of the GPG protocol. *Artificial insemination (AI), Negative pregnancy diagnose (D(-)), Corpus luteum (CL), Fixed timed artificial insemination (FTAI).*

GPPG (GnRH-Prostaglandin-Prostaglandin-GnRH): between 70 and 443 DIM.

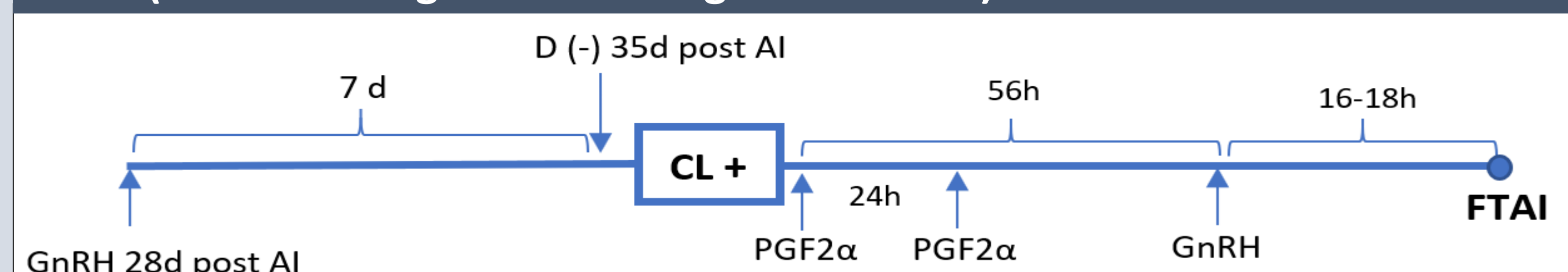


Fig. 4 Schematic diagram of the GPPG protocol. *Artificial insemination (AI), Negative pregnancy diagnose (D(-)), Corpus luteum (CL), Fixed timed artificial insemination (FTAI).*

RESULTS

- Synchronization improves conception rate (27,5% vs. 31,05%).
- GPPG has a higher conception rate than GPG (31,69% vs. 28,7%).
- Synchronization has better results when it's applied between 120-180 days in milk.
- Beyond the 180 (GPG) or 210 (GPPG) days in milk, there is no improvement on conception rate when applying estrous synchronization.

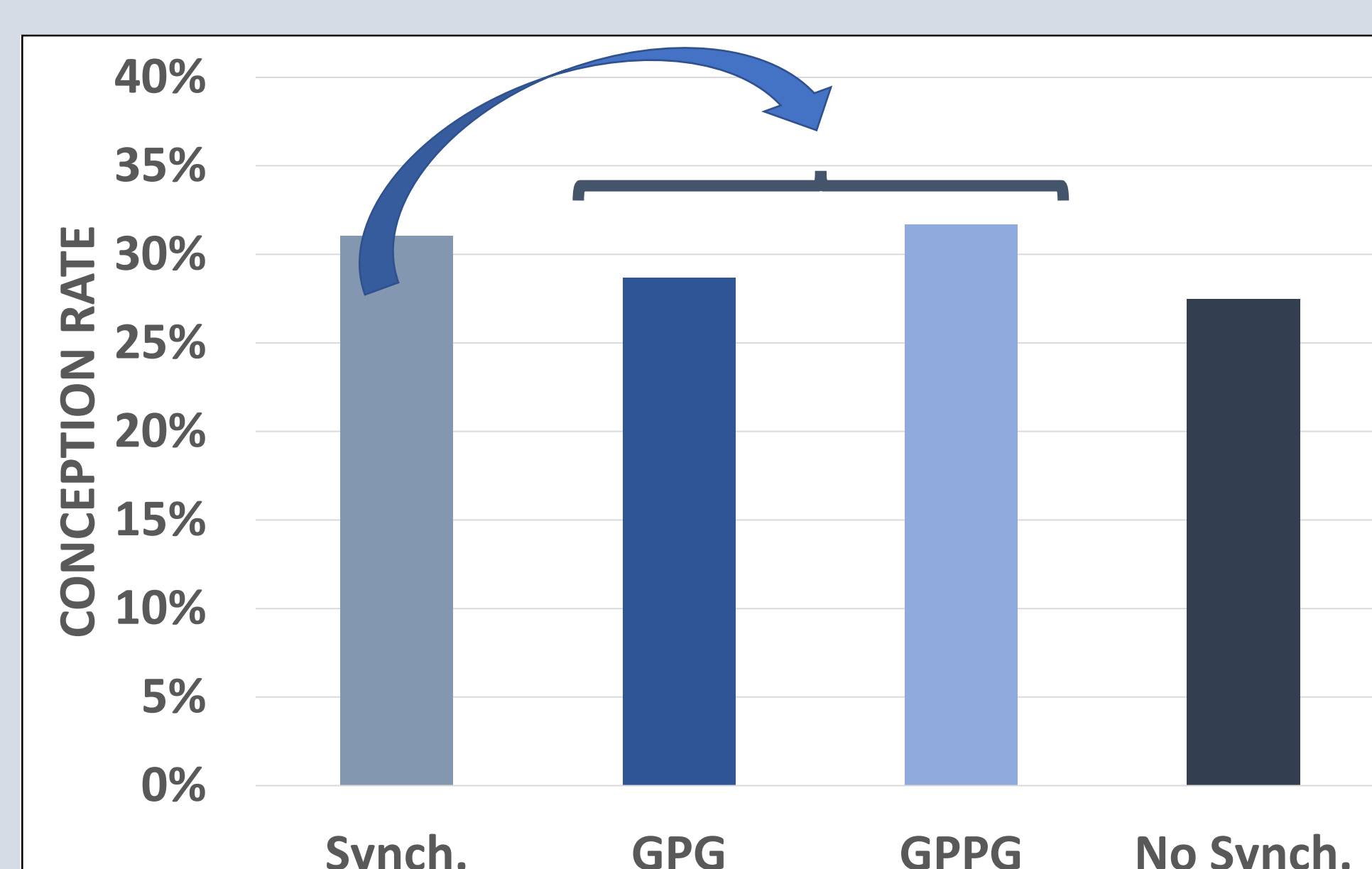


Fig. 5 Effect of the use of GPG and GPPG as synchronization protocols on conception rate. No synchron: no synchronization protocol was used.

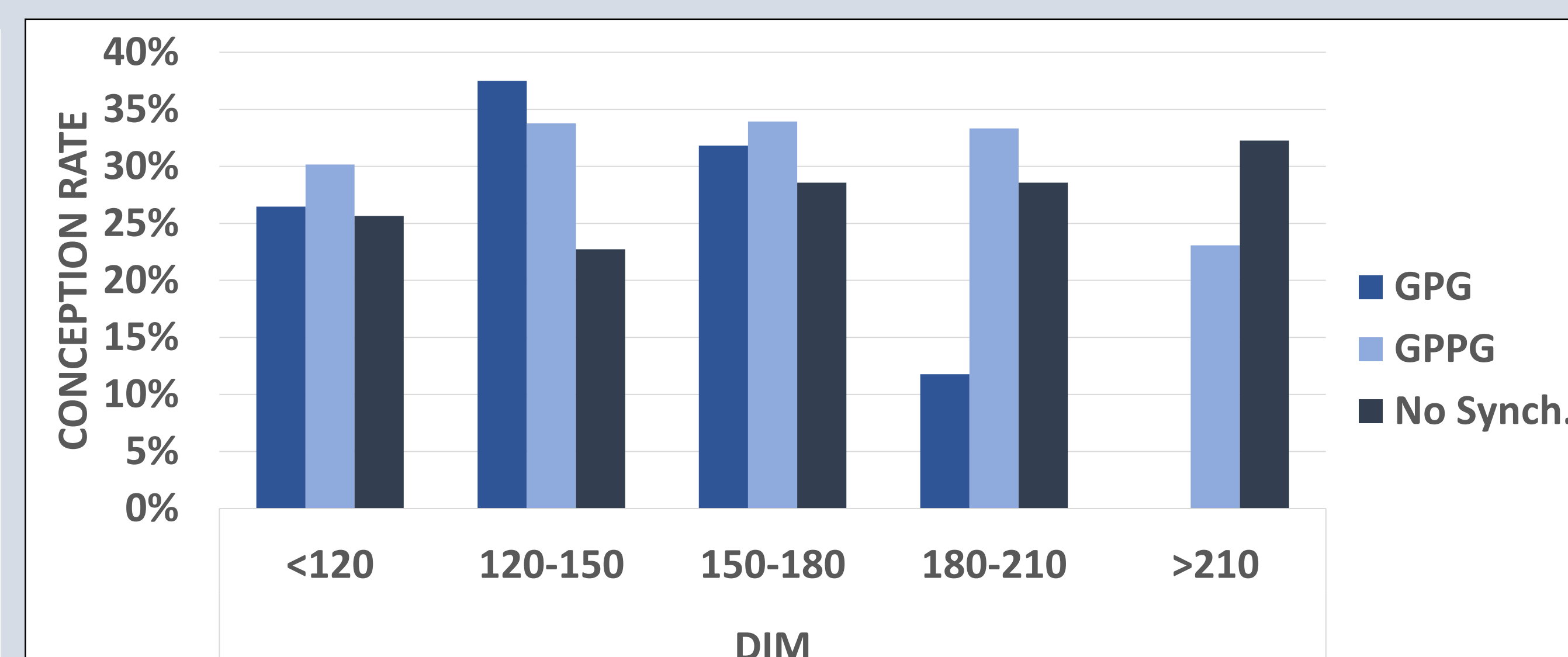


Fig. 6 Effect of the use of GPG and GPPG as synchronization protocols on conception rate, according to the calving to synchronized service interval (expressed in days in milk, DIM). No synchron: no synchronization protocol was used.

CONCLUSIONS

- It's recommended to continue applying estrous synchronization specially between 120-180 days in milk.
- GPPG gives better conception rate results than GPG, probably due to the administration of a second prostaglandin shot.
- The use of a synchronization protocol is not advisable after 210 days in milk.

REFERENCE

Reference: [1] Senger P. 2003. Pathways to pregnancy and parturition. 2nd Edition: Current Conceptions Inc, Washington.