Research That May Change Your Practice

Dr. Dallas Horton, Chairman

Estrus Synchronization and Multiple Births

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Availability of Drugs

At the present time few of the hormones known to be efficacious when used either singly or in combination for synchronization and twinning in cattle are approved by FDA for that purpose.

a. *Progestins*—Progestins are used to suppress follicle maturation, but either are not available for numerous reasons or, as in the case of melengestrol acetate (MGA) and progesterone, have not been approved for use in cycle synchronization. MGA is a new drug and its NDA is very specific, allowing use only in feedlot heifers. Old drugs like progesterone are used at the discretion of the veterinarian.

b. *Estrogens*—Estrogens cause regression of the corpus luteum when given early in the cycle. These include the long acting preparations such as estradiol valerate, and other esters of estradiol such as the benzoate and propionate. These are given in oil. Up to 1 mg of estradiol 17B in oil will cause release of LH and hence ovulation. The estrogens available to veterinarians are suspensions in water and are contraindicated for this purpose. Diethyl stilbestrol is considered inappropriate both because the doses are too high and interfere with fertility, and also because of its current status with FDA.

c. *Gonadotropins*—Gonadotropins such as PMS and HCG are used for stimulating follicle development and ovulation; they may be used at the discretion of the veterinarian.

d. Combinations such as progesterone plus PMS are not approved and, in fact, all combinations or new formulations such as progesterone in silastic are regarded as new drugs.

Summary of Present Knowledge

a. *Suppression of ovulation*—Progestins suppress follicle maturation in cycling animals. During the suppression period the follicle picture is unlikely to be normal - there may be fewer atretic follicles than normal or some follicles may have an unusual form of atresia. A normal follicle picture will occur only if the optimum suppressive dose (O.S.D.) is used for each progestin. The period from the end of the protestin regime to estrus is variable in length. The optimum period depends on the synchronization of two almost independent functions. These are the rate of "release" of the CNS from progestin suppression and the rate of maturation of the follicle.

b. *Anestrus*—In anestrous animals, such as lactating cows, progestins are required to prime the genital tract and to adjust thresholds in the hypothalamus and pituitary gland. After cessation of progestin treatment, the hypothalamic-pituitary-ovarian (H-P-O) system may rebound to mature a follicle, or exogenous ovarian stimulation may be required. This could take the form of a gonadotropin in conjunction with the progestin to grow a follicle, or an injection of HCG or estradiol at an appropriate time in relation to growth of a follicle. Success depends on knowing beforehand the precise status of the H-P-O system. At the

present time this depends on experience and palpation, but eventually, hormonal status monitoring will be practicable.

c. *Stimulation of multiple ovulation*—In cycling animals or anestrous animals the principle is the same - a gonadotropin (PMS) is given near the end of a suppressive progestin regime whether natural (estrous cycles) or administered. In cycling animals, PMS can be given on day 16 of the cycle but since one does not know exactly when the CL will regress, this method leads to enormous variation in ovulation rate and a very unpredictable (usually low) proportion of the herd with twins.

The use of PMS near the end of a progestin suppressive regime improves synchronization of estrus and fertility and will give good control over ovulation rate. The relative rates of growth of the follicles induced by PMS and the rates of "release" of the CNS from the effects of the progestin are even more critical when attempting to induce multiple births. It is particularly important to select the correct dose of PMS and give it at the correct time relative to the decline in progesterone or progestin. It is also necessary to reduce excessive growth of follicles (both rate and number), as they will reduce fertility.

Present Research

Modern research in this area centers around: (a) Obtaining NDA's for progestins - mainly problems of residues and no effect doses; (b) Developing practical methods for use of prostaglandins for synchronization; (c) Investigating the gonadotropin releasing factor (GRF) for stimulating follicle growth in anestrus, and for inducing multiple ovulations.

Role of the Veterinarian

By and large veterinarians are not confident in the use of hormones. There is a tendency to follow the label, which is an image that needs replacing. In the complex field of synchronization and multiple birth, selection of the correct dose of the correct hormone and giving it at the correct time will only follow from an understanding of the biology of the hormone and the endocrine status of the animals.

This subject will be covered in more detail in the 1973 issue of The Bovine Practitioner.

Early Postpartum Breeding in Dairy Cattle

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An experiment was conducted to determine if there were detrimental effects from breeding Holstein dairy cows as soon as possible following calving. The study included 168 cows completing 375 calving intervals. At the time of first calving, cows were assigned at random to one of two breeding groups: 1) bred at first estrus following calving (early breeding), and 2) bred at first estrus 75 or more days following calving (late breeding). Heifers were placed on experiment at first calving and the maximum time that they remained on the experiment was until the 217th day of gestation with their fourth calf. Cows were observed for estrus twice daily and all animals were bred by artificial insemination using frozen semen from "proven" sires. Reproductive tracts during the postpartum interval were examined by rectal palpation at seven-day intervals and ovarian structures were recorded. Pregnancy was determined 39 to 45 days after insemination. Cows were allowed a maximum of 300 open days following calving before being removed from the experiment as non-breeders. Treatment of reproductive problems was limited to three conditions occurring at the time of calving: 1) dystocia, 2) acute metritis, and 3) retained placenta.

There were 184 calving intervals in the early-bred group and 180 in the late-bred group. Fertility at first insemination, inseminations per diagnosed pregnancy, and number of open days for the early and late breeding groups, respectively, were: 37.0% vs. 66.7%, 2.2 vs. 1.6 and 64 vs. 101 (all $P < .005$). Fertility at second, third and fourth inseminations and the return intervals following