particularly where nitrogenous fertilizer has been applied.

Some experiments have examined the effect of feeding rumen-protected fatty acids to post-partum primiparous beef heifers, showing that this lipid feeding increased plasma levels of linoleic acid and PGF metabolite, but did not improve fertility in their subsequent breeding performance. Elsewhere, however, there have been strong indications that linoleic acid, a member of the n-6 family of unsaturated fatty acids, a specific inhibitor of prostaglandin synthetase, may be involved in the action of IFN in preventing luteolysis at the time of maternal recognition of pregnancy. There are also fatty acids belonging to the n-3 family, present in fish oil, which may help to explain some studies showing a 20% improvement in conception rates in cattle fed on diets containing fishmeal. There are those who believe that there are many exciting possibilities to be explored in nutritional management which may help to improve dairy cow fertility. Less work has dealt with nutritional influences that may improve the quality of sperm in male farm animals. In Scotland, Rooke *et al.* (2001) showed that feeding tuna oil increased the proportion of boar sperm with progressive motility and reduced the proportion of sperm with abnormal morphologies.

1.6.2. Hormones to enhance fertility

Hormones play a vital part in the reproductive processes of the female (Table 1.7) and numerous attempts have been made to reduce the incidence of embryo mortality with exogenous hormones, including progesterone, IFNs, GnRH and human chorionic gonadotrophin (hCG), all of which have produced variable results. Despite the importance of progesterone during early pregnancy, many studies with cattle fail to show any improvement in pregnancy rate following progesterone supplementation. This is thought to be due to several factors, including the potential down-regulation of high levels of exogenous progesterone on endogenous production and the fact that many of the treated cows may not require additional progesterone. Stimulating the production of progesterone by the CL may take various forms. Studies in England led workers to conclude that melatonin can act directly on the CL to increase progesterone production and that this action may be related to the reported improved luteal function late in the breeding season after the prolonged exposure of ewes to melatonin.

GnRH treatment

Much interest in commercial dairy herds has centred around the use of GnRH between days 11 and 13 after breeding, which has increased pregnancy rates in many trials. It is believed that GnRH treatment suppresses follicular oestradiol-17β and $PGF_{2\alpha}$ secretion, possibly representing a physiological mechanism for an indirect anti-luteolytic effect of GnRH. Studies in horses have also shown an increase in pregnancy rates after buserelin (GnRH) administration 8–11 days after ovulation and AI, although there has been no evidence of secondary ovulations or luteinization of follicles after GnRH administration. Given during the luteal phase (day 10 after AI), Kanitz *et al.* (2003) recorded pregnancy rates of 48.4% for GnRH-treated animals and 36.4% for controls, the inseminations including frozen–thawed as well as fresh semen and lactating as well as maiden mares.

In sheep, there is some evidence suggesting that treatment with hCG or GnRH on day 12 of pregnancy can improve embryo survival. In Wales, workers found that hCG (200 iu) may improve embryo survival by stimulating luteal and embryonic growth, but there was less indication of buserelin (GnRH analogue) acting through a similar mechanism.

In pigs, a study conducted by Peters *et al.* (2000) on sows kept outdoors employed GnRH given at 24 h after first service or on days 11 or 12 after first service; they found no significant effect of treatment on farrowing rate to first service or on litter size. Elsewhere, however, a study reported on the