THE AUTUMN ABORTION SYNDROME

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Overall about 1% of porcine pregnancies terminate in abortion (Aamdal, 1970) but in Britain a distinct increase occurs between August and November; this is termed the 'autumn abortion syndrome' (AAS). Severity of the AAS varies each year with up to 10% sows aborting in some herds whilst others experience few if any abortions. Occasionally a herd is affected repeatedly, year after year. Reports from several countries (e.g. Aumaitre et al. 1976; Beccaro et al. 1980; Hurtgen & Leman, 1980; Karlberg, 1980; Love, 1981; Stork, 1979; Tomes & Nielsen, 1979) indicate that reproductive disorders generally are increased during late summer and autumn, so the AAS may be merely a conspicuous manifestation of this general phenomenon.

The AAS affects any stage of pregnancy but, apart from expelling the litter, sows rarely show clinical illness. Fetuses in the aborted litters tend to be of equal body size, their size equating with the stage when abortion occurs. Apart from erythema and early autolysis (indicative of recent intrauterine death) fetuses are also without pathological lesions; in fact older fetuses may be aborted alive. These negative clinical and pathological features point to failure of pregnancy control in the mother rather than to prior disease in the feto-placental unit.

As to the aetiology of AAS there are several possibilities, e.g. infections, feed toxins, climatic stressors and underfeeding (Stork, 1979). Results of laboratory examinations on aborted and other fetal material submitted to Veterinary Investigation Centres in the UK are stored on computer (Hall et al. 1980), and, of 6138 submissions for 1975-80, a positive diagnosis was achieved for 31.2%. Over half of these (18%) were transplacental virus infections whilst the rest were mainly attributed to bacteria. No diagnosis was reached for the remaining 68.8% of fetal submissions, but (in contrast to the diagnosed category) numbers of these showed substantial seasonal variation, with significantly more ($p < .01$) submitted in autumn months (especially October) than the monthly average. Such data need cautious interpretation, nevertheless it seems there is an upsurge of abortions, mainly of the non-infectious, maternal failure type, in the autumn; this probably corresponds to the AAS.

We recently analysed the records of 7 large herds where AAS had, in varying degree, been a problem. Correlations were sought between abortion dates and max., min., average, and daily changes in temperature, atmospheric pressure, daylength and sunlight. No correlation was found in most instances but the AAS period did correlate closely with the period of maximum rate of decline in daylength. Whilst obviously not the sole determinant, this factor probably does have a major contributory role in the AAS.

Studies on the European wild pig have shown that in non-pregnant females oestrous cycles cease in July and recommence between October and December (Mauget, 1982). Whereas declining daylength is probably the major factor terminating their sexual activity, other factors, especially adequacy of food supply and male - female interactions, strongly influence onset of the new breeding season. If, as seems probable, the AAS and certain other seasonal reproductive disorders in modern domestic pigs are reflections of vestigial tendencies towards their ancestors' photoperiodic rhythm we would also expect to find seasonal variations in sex hormone levels in adults of the domestic species.

Of the various hormonal mechanisms of abortion (see Wrathall, 1980) the one most likely to be involved in the AAS is a reduction or failure of luteotrophic support from pituitary gland to the corpora lutea (CL). CL maintenance during pregnancy is dependent on luteinizing hormone (LH) (Kraeling & Davis, 1974), and LH secretion patterns bear close temporal relationship to progesterone output from the CL (Parvizi et al. 1976).

To see whether a seasonal reduction of CL activity occurs we measured serum progesterone levels in approx. 20 sows in mid-pregnancy in each of the 7 herds referred to above. Sampling took place in September and December 1979, and in March and June 1980. There were few abortions that particular year; nevertheless progesterone levels in 5/7 herds were significantly lower ($p < .01$) in September than in the 3 other sampled months. In the remaining 2 herds September progesterone levels were lower in 2, and 1, of the sampled months respectively. From these results it appears that hormonal support to reproduction is weaker in the autumn than at other times, and lower LH and progesterone levels associated with declining daylength could be a factor predisposing pregnant sows to the AAS. This hypothesis on its own, however, is insufficient to explain the syndrome completely, and other adverse factors, e.g. inadequate plane of nutrition (low feed-energy level), climatic stressors, social deprivation (insufficient boar contact), and genetic predisposition are probably necessary, either alone or in combination, to tip the balance between continuation and failure of the pregnancy.

Methods of controlling the AAS in affected herds include administration of HCG or progestagens so as to provide immediate hormone support to sows at risk. However, such measures can be hazardous since progestagens, at least if given in late pregnancy, can interfere with parturition. For the longer term, raising dietary energy levels and/or environmental temperatures should be of value, and increasing the social interaction with boars could, by boosting endogenous LH levels in pregnant sows, also reduce their risk of abortion. Provision of supplementary lighting to reduce the rate of change in effective daylength may be worthwhile too in certain cases.

Conclusions. Hormonal changes associated with declining daylength during late summer and autumn predispose pregnant sows to abortion of the maternal failure type. Resistance to this kind of abortion can be provided by improving the maternal energy balance, increasing social contacts between pregnant sows and boars, and minimising decline in daylength with artificial lighting.

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