

FETOPATHOGENICITY OF MATERNAL HYPERTHERMIA AT MID-GESTATION

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INTRODUCTION Environmental over-heating of the sow in early pregnancy is known to cause reduced conception rate and an increased mortality of unimplanted embryos. In late pregnancy the effects include an increase in the proportion of piglets born dead and a reduction in birth weight of live born piglets. However, it is generally believed that between about the end of the second week and the beginning of the fourteenth week of gestation hyperthermia has no fetopathic or other adverse effects on reproduction in pigs (Wrathall, 1975). This is in marked contrast to the known teratogenicity of hyperthermia in other species of mammals (Edwards, 1978). The purpose of the present study was to ascertain the effects of maternal hyperthermia at mid-gestation; and particularly its effects on the central nervous system, which could be particularly vulnerable at a time when a major growth spurt was occurring (Done, 1976).

METHODS AND RESULTS Three pregnant sows were acutely exposed while under sedation (Azaperone, Metomidate hydrochloride, Chlorpromazine hydrochloride) to high environmental temperatures (55-80°C) for 1-4 hours on gestation days 53-55. The sows attempted to maintain thermostasis by hyperventilation and tachycardia; but transient rises in body temperature of between 1.3°C and 3.4°C were achieved for at least one hour in each case. None of the sows died or evinced any systemic illness following hyperthermia; but two of them aborted at 1 and 9 days after exposure respectively. The results are summarised in Table 1, below.

The sow exposed to the highest environmental temperature for the longest time (A) had a maximum rise in body temperature of 3.4°C, and she aborted within 24 hours after the treatment. The sow exposed to a lower ambient temperature for only 1 hour, and with a maximum hyperthermia of 1.3°C (B), aborted 15 fetuses 9 days later. Skeletal radiography indicated that her fetuses had died just before they were aborted, though 5 showed skeletal evidence of impaired development some 2-3 days earlier. The remaining sow (C), which was exposed for 2 hours and which achieved a maximum rise in body temperature of 2.0°C, was delivered by elective caesarean section at term. She contained eight mummified fetuses, which had apparently died

very shortly after the hyperthermic episode, and 1 live piglet which was situated in the uterine body adjacent to the cervix.

This live piglet, which was ataxic and amaurotic, was of normal body weight; but there were anatomical abnormalities of the jaws (brachygnathia inferior) and brain (microcephaly). The whole brain was reduced in size, with specific lesions of cerebellar hypoplasia and cerebral polymicrogyria. The cerebellum showed an approximately proportional reduction in size involving both grey and white matter. In the cerebrum there was considerably less stainable myelin than normal in the corpus medullare, a reduction in the depth of the cortex, and local areas of calcification.

CONCLUSIONS Though hyperthermia may be a rare event in sows in mid-gestation, it does nevertheless appear to have adverse effects on reproduction, viz:-

- abortion, presumably due to acute maternal failure;
- fetal death, with or without abortion; and,
- maldevelopment of surviving fetuses, particularly affecting the brain.

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SELECTED REFERENCES

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TABLE 1

FETOPATHOGENICITY OF MATERNAL HYPERTHERMIA

SOW (Litter ref.)	EXPOSURE			RISE IN BODY TEMP. (°C)	FETAL DELIVERY DAY (d.p.e.)	FETUSES		DEVELOPMENTAL AGE AT DEATH
	Gest. Day	Tent Temp.	Duration (hrs)			Alive	Dead	
A (N.933/1)	53	70-80	4	3.4	54*	0	9	54
B (N.933/2)	54	60-70	1	1.3	63*	0	15	63
C (0.48/1)	55	40-75	1	2.0	114	1	8	56

* = Spontaneous abortion