



Maternal Lard and Palm Oil Consumption Produces Sex-Specific Reproductive Effects in Mouse Offspring

Rachel Hawthorne*

Department of Reproductive and Developmental Biology, Kyoto International University, Kyoto, Japan

DESCRIPTION

Maternal nutrition is an important influence on foetal development because nutrients supplied during pregnancy contribute to the formation and maturation of organs, endocrine systems and metabolic pathways. Dietary fat is particularly relevant because lipids provide energy and essential components for cellular membranes while also participating in signalling and inflammatory processes. Excessive intake of dietary fat during pregnancy can disturb maternal metabolic balance and may create developmental conditions that affect offspring health. The biological consequences can also depend on the source of fat. Lard and palm oil contain different proportions of fatty acids and excessive consumption of these fats may therefore produce distinct effects on reproductive development in male and female mouse offspring. Lard contains considerable amounts of saturated fatty acids together with monounsaturated fatty acids, whereas palm oil is characterized by a substantial proportion of saturated fat and a notable amount of oleic acid. When consumed excessively, both can contribute to high energy intake and changes in lipid metabolism.

During pregnancy, the maternal organism undergoes substantial physiological adjustments to support foetal growth. An excessive dietary fat load may interfere with glucose regulation, lipid processing, inflammatory signalling and hormonal activity. These alterations can influence the intrauterine environment and potentially affect the development of reproductive tissues in the foetus. Reproductive development depends on precisely coordinated hormonal signals. The hypothalamic-pituitary-gonadal axis regulates communication between the brain, pituitary gland and reproductive organs, controlling processes such as gonadal maturation and sex hormone production. Nutritional disturbances during critical developmental periods may alter this communication. Excess maternal fat exposure could affect endocrine signalling before birth and produce

changes that remain unnoticed during early life but become more apparent when offspring reach sexual maturity. Sex-specific responses are particularly important when considering developmental effects of maternal nutrition.

Male and female reproductive systems follow different developmental pathways and have different hormonal environments. Consequently, the same nutritional exposure may not produce identical outcomes in both sexes. Male offspring may be more affected through changes involving testicular development, testosterone production, sperm formation or supporting cells within the testes. Female offspring may instead experience alterations involving ovarian development, follicular maturation, estrogen signalling or reproductive-cycle regulation. In male offspring, excessive maternal fat intake could influence the development and function of testicular tissue. Changes in metabolic conditions may affect Leydig cells, which produce testosterone or Sertoli cells, which support developing germ cells. Increased oxidative stress may also create an unfavourable environment for sperm production because developing germ cells are sensitive to cellular damage. If hormonal or cellular disturbances occur during important developmental windows, they may persist into adulthood and contribute to reduced reproductive performance. Female offspring may exhibit a different pattern of reproductive consequences. Nutritional conditions during foetal development can influence the maturation of ovarian tissues and the endocrine signals required for normal reproductive cycles.

Excessive maternal fat exposure may contribute to altered hormone production, follicular development or communication between the brain and ovaries. Such changes could influence reproductive timing and fertility later in life. The presence of sex-specific effects demonstrates why developmental responses should be considered separately in male and female offspring. Several interconnected mechanisms may explain how maternal dietary fat affects reproductive development. Metabolic

Correspondence to: Rachel Hawthorne, Department of Reproductive and Developmental Biology, Kyoto International University, Kyoto, Japan, Email: rachel.hawthorne@reprobio.jp

Received: 30-Aug-2025, Manuscript No. JDMGP-25-32403; **Editor assigned:** 02-Sep-2025, PreQC No. JDMGP-25-32403; **Reviewed:** 16-Sep-2025, QC No. JDMGP-25-32403; **Revised:** 22-Sep-2025, Manuscript No. JDMGP-25-32403; **Published:** 30-Sep-2025, DOI: 10.35248/2153-0602.25.16.391

Citation: Hawthorne R (2025). Maternal Lard and Palm Oil Consumption Produces Sex-Specific Reproductive Effects in Mouse Offspring. J Data Mining Genomics Proteomics. 16:391.

Copyright: © 2025 Hawthorne R. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

dysfunction can increase circulating lipids and alter insulin signalling, while chronic inflammatory activity can influence tissue development and endocrine regulation. Excessive lipid availability may also promote oxidative imbalance, potentially affecting cellular structures and signalling pathways. Another possible mechanism involves epigenetic regulation, through which nutritional conditions can influence the activity of genes involved in metabolism, development and reproduction without altering the Deoxy Ribonucleic Acid (DNA) sequence itself.

The comparison between lard and palm oil is relevant because the quantity of dietary fat alone does not fully describe its biological effects. Different fatty-acid profiles can influence

membrane characteristics, lipid metabolism, inflammatory pathways and cellular signalling in different ways. However, findings from mice should be interpreted cautiously because reproductive physiology, metabolism, dietary exposure patterns and developmental timing differ between mice and humans. These observations emphasize the importance of balanced maternal nutrition. Excessive consumption of energy-dense fats may affect more than maternal body composition and metabolic health; it may also influence biological processes that shape offspring reproductive development. Recognizing differences between male and female responses can provide a more complete understanding of developmental consequences associated with maternal dietary patterns.