



Maternal Beef Diet Could Impact Sperm Counts, UR Study Suggests

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March 28, 2007, A mother's high beef consumption while pregnant was associated with lower sperm counts in her son, according to a study led by researchers at the University of Rochester.

Researchers sought to examine the relationship between semen quality and long-term risks from growth hormones and other chemicals in beef. While the study results revealed a significant link between the lowest sperm counts and mothers who were the highest beef consumers (seven or more beef meals per week), researchers could not pinpoint hormones, pesticides or other environmental chemicals in the animal fat as a direct cause.

"What we're really doing here is raising an issue," said Shanna H. Swan, Ph.D., director of the Center for Reproductive Epidemiology at the University of Rochester Medical Center and lead author of the study. "The average sperm concentration of the men in our study went down as their mothers' beef intake went up. But this needs to be followed carefully before we can draw any conclusions."

The study is published March 28 in the journal Human Reproduction.

It's important to note that all of the 387 men in the study were able to conceive a child without medical assistance, so although sperm counts were low in some cases none of the men were actually infertile. Yet among the 51 men whose mothers were the highest beef eaters, almost 18 percent had sperm counts classified by the World Health Organization as "sub-fertile" (20 mill/ml or lower). By comparison, sperm concentrations were 24 percent higher for men whose mothers ate less beef, and only about 5 percent had sperm counts that could be classified as sub-fertile.

The concern, Swan said, is that high beef consumption by pregnant women may alter sperm production of the male fetus in utero, particularly at the end of the first trimester during the critical period for testicular development. Although sperm production occurs in stages -- prenatal, during puberty, and into adulthood -- the most important stage for developing semen quality occurs in the womb, Swan added.

The study participants were part of the federally funded, multi-center Study for Future Families, a cohort of pregnant women and their partners who have agreed to provide data so that scientists can investigate environmental causes of variations in reproductive health. Swan, a professor of Obstetrics and Gynecology, has been the principal investigator of SFF since 1998. The National Institutes of Health supported this project.

Men from the SFF cohort born between 1949 and 1983 were requested to ask their mothers to complete a questionnaire about her prenatal diet. During this time period, it would have been difficult for the mothers to avoid hormone residues in beef products, as numerous chemical additives were used.

Today, anabolic hormones continue to be legal in the United States and elsewhere, although the Food and Drug Administration has defined an "acceptable daily intake" for each of the six hormones commonly used in cattle. In 1979 the FDA did withdraw approval of the use of diethylstilbestrol (DES), the first synthetic hormone, in cattle. (The European Union banned the use of growth promoters in cattle in 1988.)

Researchers studied the sons' semen quality for movement, concentration and other properties. Then they used statistical methods to relate each man's semen quality to the data on his mother's diet.

Mothers who reported eating an average of more than one meal a day of beef were referred to as "high beef consumers." The average number of beef meals was 4.3 per week. Researchers also examined the mothers' consumption of other meats (pork, lamb or veal), as well as fish, chicken, soy products and vegetables, but did not observe a significant association between sperm count and these other foods.

In addition, researchers looked at the sons' own beef consumption, and found no association with semen quality.

Several explanations for the findings are possible, Swan said, including pesticides and other contaminants in cattle feed, as well as lifestyle factors during pregnancy that may correlate with greater beef consumption. Swan acknowledged that the mothers' beef recall is subject to error, although pregnancy is usually a time of heightened awareness.

"This study must be replicated to confirm our findings," Swan said. "One way to determine if prenatal exposure to anabolic steroids is responsible for a change in sperm count would be to repeat this study in men born in Europe after 1988, when hormones were no longer permitted in beef sold or produced there.

Swan said she cannot advise women on how much beef is safe to eat during pregnancy. "We don't have the numbers to identify a 'saf

e cutoff,' Swan said, "but in these data it seems to be the very high beef consumption that raises questions.

In previous studies, Swan has looked at whether semen quality is associated with exposure to farm pesticides in men from rural Missouri versus urban areas such as Minneapolis or New York. But this is the first study to examine beef intake and semen quality. A lack of human data on the safety of anabolic steroids in meat production prompted the latest analysis.

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