



SEXING MAMMALIAN SPERM — OVERVIEW

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THE NEED FOR SEX CONTROL

Being able to preselect the sex of offspring at the time of conception ranks among the most sought-after reproductive technologies of all time. This ability runs counter to trends of nature which has gone to extreme lengths to make X- and Y-chromosome-bearing sperm phenotypically identical so that mammalian sex is determined randomly, with equal chances of male or female offspring (18). However, from an individual's (or couple's) perspective, the sex of the next child born often matters, as does the sex of offspring to owners of certain individual domestic animals.

In the year 2000, the situation with regard to sex selection is fundamentally different from what it was 50 or 100 years ago. We illustrate this with 4 examples.

Perhaps the most important application of sexing is to minimize sex-linked genetic disease in the human population. There are more than 500 known X-linked diseases, some of which are extremely debilitating. In most cases, half of the sons born from female carriers of X-linked genetic disorders will be affected, while daughters will not. Thus, sex preselection to increase the chances of having a female child gives the couple reasonable assurance that they can avoid expression of the disease in their offspring (7). A less compelling application is sex selection for purposes of family gender balancing. Even so, parents with at least one child of a particular sex could decide for the opposite sex so as to balance the sex of family siblings. This more controversial application of sex preselection in human beings, nevertheless, has considerable potential for decreasing population growth (19) in a non-coercive manner.

Over the past century, husbandry practices in animal agriculture have changed dramatically in developed countries. Sexing becomes particularly valuable with the systems of maternal and terminal-cross lines that have arisen recently. Inefficiency always has been a dilemma with sex-limited traits such as milk production and producing the mothers of the next generation (where males are a by-product), but it now also is an issue with sex-influenced traits such as more efficient growth of male beef animals (9). We are seeing dramatic changes in swine production with consolidation and vertical integration that affects how swine are produced and marketed. The use of sex preselection has great potential for increasing efficiency. In the future, those not taking advantage of efficiencies such as sex control may be buying animal products from those who do. Just as we have seen major changes in markets associated with animal agriculture over