

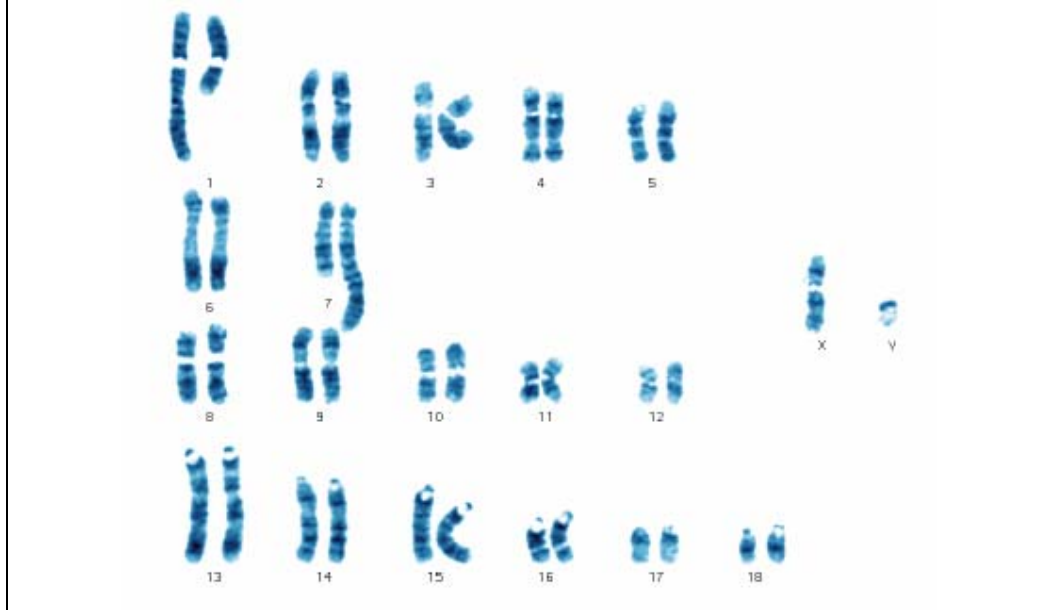


Detection of hypoprolific boars potentially carrying chromosomal abnormalities

Canadian Centre for Swine Improvement Inc

- Structural chromosomal abnormalities have been studied in swine for many years. The first one was identified and described almost 40 years ago. Control programmes were initiated in several European countries at the beginning of the 1970's. They were based on karyotypic analyses of hypoprolific boars detected using national herd management databases. Many different chromosomal rearrangements, mainly reciprocal translocations, were identified. The continuous improvement of chromosome banding techniques made it possible, during the last decade, to identify and characterize new rearrangements modifying very slightly the morphology and/or the banding profile of the chromosomes. One hundred or so structural chromosomal abnormalities have been published so far.
- Reciprocal translocations are the most common chromosomal abnormalities found in pigs. To date, 87 different translocations have been described. Each chromosome, except the Y gonosome, can be involved in one or several translocations. All breeds currently used in pig production have already been affected at least by one translocation. These chromosomal peculiarities generally lead to a decline in the reproductive performance of carrier animals, males and females, because of the production of unbalanced gametes. The effect on litter size is very variable according to abnormalities and animals, but in literature some results show 40% reduction in prolificacy.
- Detection programs of such boars are usually based on routine computations in national databases. More and more programs are now using "by-products" of BLUP genetic evaluation as detection tools. For this purpose, the effect of service sire is usually included in the evaluation model, as a fixed or a random effect. The main advantage is to provide direct effects of service sires on litter size, these effects being corrected for various effects, such as herd, period or breeding values of sows.
- Whatever is the system used, the detection of hypoprolific boars is usually possible after a minimum of 10 litters is born. In many cases, the boar is already culled when it is declared as a potential carrier of an abnormality. That's why more and more countries now perform karyotypes systematically on every AI boar.
- In the Canadian genetic evaluation for litter size, the service sire breed is included. A direct boar effect could be included in order to detect potential hypoprolific boars in the current system. That would require minor changes in the current programs. If need be, some suspect boars could be karyotyped in order to check for any known chromosome abnormality.

Example: karyotype of a boar heterozygous carrier
of a 1/7 reciprocal translocation



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