A large scale trial was to be conducted to determine the effect of semen diluents on conception rate in the artificial insemination of cattle. The experiment was a $2^4$ factorial, the sixteen treatments consisting of either citrate or phosphate buffer with all combinations of sulfanilamide, streptomycin, and penicillin. The work was done at four centers and every treatment was replicated twice at each center.

A difficulty that arose with the experimental design was that each sample of semen, that is each collection from each bull, was split into two parts and different treatments used on the two parts. The aim was that by making comparisons of treatments within samples from the same bull, precision would be increased. Different centers had different bulls, of course.

Finally, each pair of treatments was used at one center for about two weeks and the observation was the conception rate for the cows serviced during this period. After two weeks using one pair of treatments at a center, a new pair was used for the next two weeks, and so on until the eight pairs forming the first replicate had been completed. The second replicate was then run in a similar way.

Please design this experiment.