

A 100 per cent fatigue curve may be produced, then, only when the number of foot contacts decreases in each successive inning.

Should the subject fail to put forth his best effort,—“go all-out”—in any one inning that failure would be apparent by no score decrease in the next period. In fact, a self-imposed easy session usually is followed by one with an increase in foot contacts. Lack of steady decrease in scores indicates an error in “application” by the runner, and shows that there are inhibitions operating within him guarding from overwork. In calculating these errors 10 per cent is subtracted for each period in which no decrease in score occurs. Thus, a 90 per cent fatigue curve indicates that the runner failed to do his best in one period.

After the pattern of the 100 per cent curve was established in preliminary tests, it was found that repetitions of the test could be used to measure improvements in Production and Application. That is, when a subject later repeated the test, his production record tended to increase. The improvement could be charged to mastery of the skill, to more intense application, or to better physical condition developed by the previous test. Of the three possibilities it was found that the improvement in production resulted almost entirely from better condition brought by the training.

The next and last step was to measure how much these vigorous work periods affect the various organic systems of the participants, and whether or not any of them had been damaged. In this measurement time did not allow complete examination of all vital organs, but since the actions of the heart give accurate indications of physical fitness the pulse rates were recorded. Physical fitness is more than an ability to execute a skill; it involves an ability to recover rapidly from the effects of fatigue. Pulse rates taken just before a measured work period, and for several periods immediately after the effort give a true picture of the speed of recuperation. A series of individual fatigue curves combined with pulse records, thus can be used to measure amount of effort; to note improvement of production and application; and to show the effects of exercise upon physical condition.

In these tests the heart rate was recorded before the subject began spot running and immediately upon ceasing. Then additional pulse recordings were made after two, four and six minutes of rest. The statistical data collected show clearly that regulated