# RAIN, RAIN, GO AWAY...

***GEORGE CHRISTOS, a lecturer in Applied Mathematics at Curtin University of Technology in Perth, looks at the inadequacies of various rain-rule systems for limited-overs matches and comes up with his own simple solution by adjusting the number of available wickets...***

THE PROBLEM of ensuring a fair contest when a one-day, limited-overs match is affected by rain remains unsolved. The original run-rate system was so biased towards the team batting second that whenever rain looked threatening the team that won the toss invariably chose to bat last. A new system was introduced in Australia and New Zealand for the World Cup in 1992, but this was a failure since it gave the team batting first an unfair advantage. A modified version of this system is currently used in Australia. A completely new system was introduced by the ICC in 1995. In 1997 and 1998 the ECB introduced the Duckworth/Lewis (D/L) method for setting target scores in all county and domestic One-Day Internationals.

The problem with these next generation systems is that they are artificial and unnecessarily complicated. The public and most players do not understand how target scores are calculated, and it is difficult to foresee what might happen in the event of further interruptions.

The basic idea behind limited-overs cricket is to see which team can score the most number of runs from a fixed number of balls faced (usually 50 overs) under similar playing conditions. The key is to see which team can score at the highest average run-rate.

In the original run-rate system, when bad weather interrupted play and time was lost, resulting in a shortening of one or both innings to fewer than the stipulated overs, the team batting second would chase a target calculated by multiplying the run-rate of the team that batted first by the number of overs that could be bowled to the one batting second.

The third and deciding final in the World Series Cup between Australia and West Indies in 1989 was ruined by the bias in these rules. West Indies had an enormous advantage because they had all 10 wickets available to make an adjusted 108 from 18 overs in reply to 226 made in 38. They only needed to sustain Australia's run-rate for less than half their overs.

The system used in the World Cup of 1992 gave the team batting first a distinct advantage. The target of the team batting second was reduced by subtracting from the opponent's total the runs scored in the corresponding number of lost overs that had the least runs scored from them. Therefore, the team batting second needed to chase a higher run-rate to compensate for batting for fewer overs. It took only a small reduction in the number of overs for the team batting second to find themselves chasing almost the same total as the team that batted first but in fewer overs.

Teams generally elected to bat first when they won the toss and most of the rain-shortened games were adversely affected. In the semi-final between England and South Africa, South Africa, chasing 253 runs in 45 overs, needed 22 runs off 19 balls to win when they lost three overs. Since they had bowled three maidens, South Africa required an impossible 22 runs off the last ball.

The system currently used in Australia, which was modified in 1995/96, compensates the team batting second by reducing further their target by 0.5 per cent for each over lost. For a target score of around 200 runs, this reduction corresponds to about one run an over. However, since the lowest-scoring overs are still deducted to arrive at the preliminary target, this system still penalises a team for bowling well in the first innings. It is also unnecessarily complicated as most players and the public do not understand how targets are calculated and how the situation might change if there is a further reduction in the number of overs. Incidentally, South Africa would have needed 19 runs off the last ball in this modified system.

IN JULY 1995 the ICC ratified a system without insisting on its universal application. If the side batting second cannot receive its full quota of overs, the target score is calculated according to a Target Score Calculation Chart by multiplying the score of the team batting first by the percentage factor for the number of overs to be bowled to the team batting second. The percentage factors

TARGET SCORE CALCULATION CHART

| Overs | % Factor | Overs | % Factor | Overs | % Factor |
|---|---|---|---|---|---|
| 25 | 66.7 | 34 | 82.2 | 43 | 94.2 |
| 26 | 68.4 | 35 | 84 | 44 | 95.1 |
| 27 | 70.2 | 36 | 85.3 | 45 | 96 |
| 28 | 72.4 | 37 | 86.7 | 46 | 96.7 |
| 29 | 74.2 | 38 | 88 | 47 | 97.8 |
| 30 | 76 | 39 | 89.3 | 48 | 98.7 |
| 31 | 77.8 | 40 | 90.7 | 49 | 99.6 |
| 32 | 79.1 | 41 | 92 | 50 | 100 |
| 33 | 80.9 | 42 | 92.9 | | |

are claimed to have been derived from a detailed mathematical analysis of a database of one-day matches to establish a 'normal performance'.

For example, if the team batting first scored 250 runs in their 50 overs and the innings of the team batting second is reduced to 35, the target becomes $250 \times {}^{84}/_{100} = 210$.

If the target was set on run-rates alone, as originally, it would have been 175, so clearly the ICC system tries to take into account that the team batting second has more wickets available for fewer overs. In many respects this is very similar to the system currently used in Australia, except that it cleverly avoids the contradiction where the team batting second is effectively penalised for bowling well in the first innings.

However, it suffers from its complexity for the players and the public, in calculating the target score for themselves and determining the consequences of further interruptions. Nor does it explain what happens if the team batting first does not receive the full stipulated overs. Clearly the team batting first is disadvantaged if their innings is suddenly reduced, especially in view of the fact that their run-rate generally accelerates in the last part of the innings. There is no compensation for this.

The system is artificial and cannot properly take into account the length, timing, and frequency of interruptions. Nor would it have resolved the fiasco in the 1992 World Cup semi-final. South Africa would have needed an equally impossible 13 runs off the last ball.

For the 1999 World Cup in the United Kingdom there are plans to adopt the D/L method. The basic idea behind this system is to estimate the resources (overs and wickets) lost by a team when their innings is shortened. From a set of detailed tables, which summarise previous match data (incidentally, collected from matches played under different rules and conditions), one is able to calculate a revised target score for the team batting second. The D/L method is actually contrived to try to ensure a close finish and really ignores the possibility that one team may be genuinely better than the other.

One of the main criticisms of the D/L method is that it is much too complicated for players and spectators. One can hardly expect players to be able to determine strategies in the event of further interruptions due to rain if they do not understand the system for setting target scores. Since its inception in 1997 a number of anomalies have been discovered and subsequently 'patched'. In two years the tables and formulae have changed quite dramatically, and there is no reason to think that more changes will not be required. For this reason the D/L system is really only a band-aid solution, and it will be difficult to incorporate it into the Laws of cricket. Scorers, umpires, and commentators will also need special, and on-going, training.

The ECB plans to keep players and spectators up to date with the state of the game according to the D/L method on an over by over basis, with the help of a computer programme. Let us hope there is no power failure or computer glitch. The other problem is its applicability at lower levels of the game.

If one was to apply the D/L method to the infamous England v South Africa semi-final, South Africa would have been set the target of 277 runs off 45 overs, and if penalties for slow bowling are imposed according to the revised D/L method then this target would go up to 289 runs. When South Africa's innings was disrupted, and play resumed with one ball to face, SA would have needed 24 runs and 35 runs respectively off the last ball to win. If, on the other hand, the match was considered as 45 overs per side from the start, South Africa would have won by five runs (or more appropriately four wickets).

THE ONLY proper way to resolve the problem of fairness in a one-day game where one or both innings have been shortened is to average the 10 available wickets effectively over the stipulated overs, with both teams competing on run-rate. A team batting its full quota should be deemed to have used all of its 10 wickets. If the number of overs is reduced, the number of available wickets should also reduce, by one wicket for every five overs lost. The rule about the number of available wickets would also apply if there is a reduction in the number of overs in the first innings. If the team batting has already used up its appropriate number of wickets when the interruption occurs the innings is shortened and it will be deemed to be all out.

The other important feature is that both teams know precisely what is expected of them