



**Figure 2.16**  
Maximum power produced versus rpm in forward and backward pedaling.  
(From Spinnetti 1987.)

#### PowerCranks and the active involvement of the lifting muscles

One clever approach to involving additional major muscles in pedaling is that given by Frank Day's PowerCranks. These are built with one-way clutches so that each leg has to lift itself (helped neither by the counterbalancing weight nor by the downpush of the other leg). Used only in training, they force the development of some large muscles that most of us are content to leave uninvolved, with the following results claimed: "Elite mountain bikers have shown documented power improvements of about 20% in 7 months (440 watts to 520 watts using Conconi protocol) and almost 40% improvement after about 9 months of use (440 watts to 580 watts)" (Day 2001). The testing protocol, originally developed to reveal LT, reports the maximum power attained for the final full minute of a ramp power test, in which the ramp rate is initially 40 W/min until a pulse rate of 145 is reached, then 20 W/min until exhaustion. Although this is a very promising result, with just a single ramp rate it is not possible to determine whether it is anaerobic work capacity, critical power, or both that improved.