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A year in the life of a Brazilian professional female road cycling team – Part I: Performance measures

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Background: Professional women's road cycling is growing in popularity and increasing in terms of numbers of participants and competitions, and in 2016 the Women's World Tour was established. Female World Tour cyclists can cover between 13 000 and 18 000 km in training and competition each year, including up to 65 competition days (Sanders et al., 2019). Interest and participation in cycling in Brazil is growing and the national cycling calendar contains 10 elite female events consisting of 20 days of competition, in addition to numerous regional and state competitions on a more regular basis. Nonetheless, little is known about professional female cycling in Brazil. We aimed to determine the training and competition demands of a professional Brazilian female cycling team throughout a competitive season.

Methods: Five female Brazilian cyclists (age 26 ± 4 y; body weight 53.6 ± 4.2 kg; height 1.64 ± 0.05 m) from the same professional cycling team, including the former Brazilian national time-trial champion and two current members of the Brazilian national road-race team, were monitored throughout their competitive season. A standardised exercise test was performed at three moments throughout the year (March, July and December 2018). The exercise protocol comprised an incremental cycling test until volitional exhaustion (De Pauw et al., 2013) to determine maximal oxygen uptake (VO_{2max}) using a breath-by-breath system (Quark, Cosmed, Italy), maximal power output (W_{max}) and maximal heart rate (HR). Training and competition data were acquired using everyone's preferred GPS system (Garmin Connect, Strava, Training Peaks) and power data from two athletes was acquired (Garmin Vector, Garmin, USA).

Results: The athletes spent a total of 193 ± 56 days on the bike (range: 104 – 234 days), completing 164 ± 45 days training (range: 89 – 206 days) and 30 ± 16 days competing (range: 15 – 55). The total distance covered over the year was 11124 ± 2895 km, ranging between 7382 and 14698 km (Figure 1). Distance covered during training was higher compared to competition (9037 ± 2027 vs. 2111 ± 1253 km) for all athletes, as was time spent training (334 ± 72 vs. 61 ± 33 h; Figure 1).

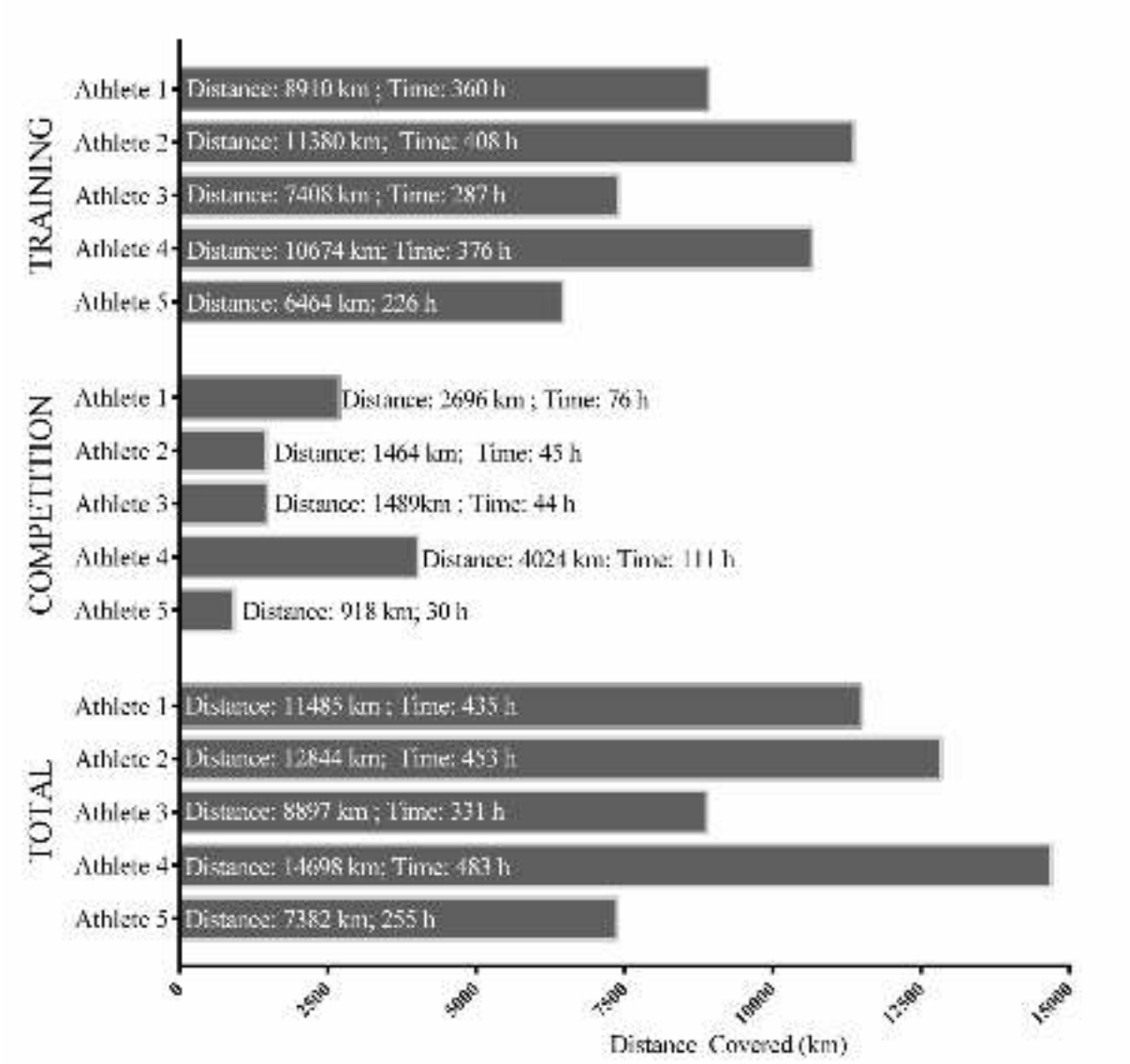

Figure 1. Distance covered by each athlete during training and competition throughout the season.

Mean power output during training was 113 ± 28 W for Athlete 1 and 128 ± 16 W for Athlete 2; peak power output during training was 469 ± 192 W for Athlete 1 and 472 ± 172 W for Athlete 2. Mean power output during competition was 174 ± 30 W for Athlete 1 and 167 ± 12 W for Athlete 2; peak power output during training was 803 ± 168 W for Athlete 1 and 795 ± 91 for Athlete 2.

Laboratorial exercise performance data showed that most athletes maintained their exercise capacity from the start of the season until midway, although the end of season showed a marked decline in these variables for all athletes who returned for testing (Table 1).

Table 1. Exercise performance data from the incremental cycling test to exhaustion: Maximal oxygen uptake (VO_{2max}), maximal power output (W_{max}) and maximal heart rate (Max HR).

			Start	Mid	End
Athlete 1	VO_{2max}	$ml \cdot kg^{-1} \cdot min^{-1}$	62.3	61.3	52.5
	W_{max}	W	303	284	260
	Max HR	$beats \cdot min^{-1}$	194	193	191
Athlete 2	VO_{2max}	$ml \cdot kg^{-1} \cdot min^{-1}$	53.7	-	44.4
	W_{max}	W	214	-	184
	Max HR	$beats \cdot min^{-1}$	187	-	184
Athlete 3	VO_{2max}	$ml \cdot kg^{-1} \cdot min^{-1}$	51.2	50.3	-
	W_{max}	W	237	230	-
	Max HR	$beats \cdot min^{-1}$	187	183	-
Athlete 4	VO_{2max}	$ml \cdot kg^{-1} \cdot min^{-1}$	54.3	56.0	50.9
	W_{max}	W	252	255	240
	Max HR	$beats \cdot min^{-1}$	186	183	183
Athlete 5	VO_{2max}	$ml \cdot kg^{-1} \cdot min^{-1}$	55.9	56.2	-
	W_{max}	W	238	227	-
	Max HR	$beats \cdot min^{-1}$	187	176	-

Discussion: Our data show that several of these professional Brazilian cyclists covered similar distances to those covered by World Tour level cyclists, one athlete covering up to almost 15 000 km. Over 150 days were spent training while between 15 and 55 days were spent competing in a total of 58 different races over the year across 5 countries (Brazil, Belgium, Chile, Uruguay and Italy). Four of the 5 athletes travelled to Belgium for 10 weeks to compete in international events between April and June and 19 of the 56 races were disputed during this 10-week period. Athletes 1 and 2 travelled to Chile for the Pan American Track Cycling Championships in May. Athlete 2, who did not travel to Belgium, fractured her wrist prior to mid-season testing and did not take part in these evaluations. Two of the athletes were called up to represent Brazil at the 2018 UCI Road World Championships in the Women Elite Individual Time Trial (Athlete 1) and the Elite Road Race (Athlete 4). Unfortunately, Athlete 1 sustained a crash in early August, ruling her out of the World Championships and she also sustained a fall shortly following her return to training in September, fracturing her collarbone requiring surgery. Athlete number 3 became pregnant towards the end of the season and did not complete any end of season analyses. This highlight the complex nature of professional

female cycling which involves substantial time training, competing and travelling, as well as significant risks of injury.

All athletes had high VO_{2max} values at the start of the season, classifying them as trained, well-trained or professional according to the criteria of Decroix et al. (2016). Mid-season testing revealed that the cyclists continued to maintain this high cardiorespiratory capacity, with everyone maintain values within 3%. However, end of season laboratory test performance was worse for all returning athletes, with reductions of between 6 and 17%. This was also reflected in the W_{max} attained during the same incremental test. The explanation for the considerable decline in laboratorial test performance is unclear although we could speculate that it may be due to a plethora of factors including accumulated fatigue over the season and injuries. They were not associated with clinical parameters (data not shown). Monitoring fatigue and its foremost causes over a cycling season would allow greater understanding of the demands placed upon this athlete population and may also provide insight into optimising preparation (i.e. training, nutrition, schedule) for peak competitive performance.

Conclusion: These professional Brazilian female cyclists had training and competition schedules similar to female World Tour cyclists, competing in numerous national and international competitions. A reduced exercise capacity, as measured by laboratorial tests, at the end of the season is perhaps indicative of a gruelling year-long schedule although further research is warranted to assess the various demands on professional female cyclists throughout the season.

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