



Data Descriptor

Distance, Speed and High Intensity Characteristics of 0 to 24-Goal, mixed and Women's Polo

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Abstract: This dataset presents information pertaining to the spatiotemporal characteristics of Polo play from a 0 to 24-goal level. Data were collected by player worn GPS units, across a New Zealand Polo season. The dataset comprises observations from 466 chukkas of Polo, across mixed and women's only Polo and is curated by cumulative player handicap. Data are presented for distance, speed and high intensity metrics, which have further categorised into five equine-based speed zones. The purpose of this dataset is to provide a detailed quantification of a range of Polo performance levels, advancing the scope and size of previous Polo literature that has employed GPS technology. This dataset may be of value to equine scientists and trainers, veterinary practitioners and sports scientists.

Dataset: available as the supplementary file

Dataset License: CC-BY-NC

Keywords: polo; GPS; horse welfare; speed; distance

1. Summary

Polo is an equestrian based team sport, contested by two teams of four players on a 150 m × 275 m pitch. Play is divided into 7 min periods of play termed chukkas [1]. Dependent upon the level of Polo being played, four or six chukkas are contested, with the objective being to score more goals than the opposing team. Players are awarded a handicap by the local Polo body between −2 and +10 goals [1]. The cumulative team handicap dictates the level of play, e.g., 24 goals (for instance, a team made up of four 6-goal players).

Global positioning systems (GPS) use in Polo is in its infancy, with previous literature utilizing GPS datasets to inform training programs [2] and assess one-off high goal match demands [3,4]. Currently the largest dataset to have employed GPS within Polo comes from a reliability study [5], which assessed 37 unique horse-rider interactions. The current dataset was collected over the course of a New Zealand Polo season, across a full spectrum of handicap levels and incorporates results from mixed and women's only Polo. The purpose of this data collection was to curate a large and transparent dataset to provide detailed quantification of each level of Polo played. The ability of this dataset to differentiate the characteristics of play between mixed and women's only Polo is a point of difference over previously published acute works [2–4].

The intention of this dataset is to identify differences in spatiotemporal characteristics between levels of Polo play, as ascertained by cumulative player handicap. This could be useful to inform not only training demands and programs, but ultimately horse welfare and performance management strategies. This dataset may also be of interest to veterinary practitioners and researchers, and may pique the interest of sports scientists, as Polo is currently an underexplored area within that discipline [5,6].

A further advantage of the public deposition of this dataset, is that we provide an anonymized repository for information pertaining to the demands of 0 to 24-goal Polo that would not be created organically within the global Polo community. This is likely due to the high level of financial investment in and the competitive nature of the sport, which may foster an unwillingness to openly share information as this may be perceived to provide a tactical advantage. However, we feel that by providing a large and anonymous dataset, these data may be of potential use in elevating the understanding and practices employed within New Zealand and global Polo, across all levels of play.

2. Data Description

This article describes data obtained via GPS from the Waikato and Auckland regions of the upper north island of New Zealand from Polo players mounted on ponies competing in 0–24 goal Polo. The pitch sizes were 150m × 275m and are the biggest pitches used in professional sport. GPS data were recorded per game and split into separate periods of play (chukkas) for analysis purposes, with chukka length ranging from 6:23 to 19:27 (min:sec). The data included within this article describe the distance, speeds, and high intensity activities performed by each player per chukka, as per Table 1. There were no constraints or pre-configured playing requirements of players, as an authentic and habitual playing profile was sought.

Data are presented in sheets pertaining to the separate key variables of distance, speed and high intensity activity, with gender, date and chukka length information provided per recorded sub-variable. Data should only be interpreted via cumulative player handicap or gender, as mixed methods of play can impact on the speeds, distances and high intensity activities performed by riders. Speed zones (1–5) (as described in methods) were then used to separate data into relevant portions and are presented alongside the variables outlined below.

Table 1. A description of variables derived from GPS recording providing a quantitative description of players' movements. Sub-variable names and descriptors were retrieved from VX Sport [7].

Variable	Sub-Variable	Description
Distance (G)	Distance Total (m)	Total Distance of all the data collected. Can be changed dependent on Trim periods selected.
	Distance Rate (m/min)	The rate that gives us distance travelled per unit of time.
	Distance Speed Hi-Inten (m)	Total distance that is covered at a specified High Intensity threshold.
Speed (G)	Speed Avg (km/h)	Calculates the Average Speed of the session.
	Duration Speed Hi-Inten (min:sec)	Total duration that is gathered from above the High Intensity Speed Benchmark
	Speed max (km/h)	Returns the maximum instantaneous speed that the athlete reached during the session
High intensity (A)	Sprints Total (num)	Total amount of Sprints that fall in the sprint equation
	Sprints Hi-Inten (num)	Total amount of sprints that are above the High Intensity Sprint Benchmark
	Body Impacts (num)	The number of Impacts within the session
	Hi Intensity Effort	The total number of efforts reported across five specific metrics (Hi-int Sprints, Hi-int Accel, Hi-int Decel, Body impacts & Jumps).
	AccelerationsAcceleration Zone Total (num)	Total number of sprints within each acceleration zone
	Distance AvgAcceleration Zone Total (m)	Average distance covered within each acceleration zone.
	Distance maxAcceleration Zone Total (m)	maximum distance covered within each acceleration zone
	Distance TotalAcceleration Zone Total (m)	Total distance covered in each acceleration zone.
	DecelerationsDeceleration Zone Total (num)	Total number of decelerations completed in each zone
	Hi Int Deceleration	The total amount of deceleration's that are above the High Intensity Deceleration Benchmark
High intensity (A)	Distance AvgDeceleration Zone Total (m)	Average distance covered within each deceleration zone
	Distance maxDeceleration Zone Total (m)	maximum distance covered within each deceleration zone
	Distance TotalDeceleration Zone Total (m)	Total distance covered in each deceleration zone.

Variables assessed via GPS are denoted with a (G); data captured from accelerometers are noted by (A).

3. Methods

The investigation was carried out following the rules of the Declaration of Helsinki and in accordance with the International Guiding Principles for Biomedical Research Involving Animals as issued by the Council for the International Organizations of medical Sciences. Approval from the Waikato Institute of Technology ethics committee was obtained in October 2018 prior to undertaking this research. Project identification codes are not current institutional procedure. Players who participated in this investigation were all in possession of a current New Zealand Polo Association handicap (−2 to +7 goals mixed; −2 to +10 goals women) and provided voluntary informed consent for them and the performance of their ponies to contribute to this dataset. Data relating to the Polo handicaps of individual participants have been removed to preserve athlete anonymity; such identifiable materials are not of relevance to the dataset and may have breached participant consent if included.

Data were collected using player mounted GPS units (VX Sport 350, Wellington, New Zealand) set in equine mode, to enhance the tolerable upper limit of data presented when extracted and analysed subsequently. These devices are equipped with 8th Generation 10Hz Swiss high precision chips, that support multiple satellite systems, 104Hz tri-axial accelerometry and 18Hz tri-axial gyroscope and magnetometers. Raw accelerometer and magnetometer data were excluded from the present dataset to minimise error due to individual rider and horse gait and playing profiles. Whilst such movement signatures are likely interesting, work independent of this investigation is required to fully understand these factors. We have previously shown that the data processed by the unit manufacturer's software to produce reliable spatiotemporal data whether mounted in a specialist vest or mounted on the players' belts [5], hence this processed data is preferred. All players in the present dataset opted to wear the unit on their belt in a pouch, secured by tape. This position is preferred as it does not impair rider comfort or performance, and is positioned closest to the saddle. We assigned each player the same GPS unit for repeat observations to minimize error due to differences in inter-unit reliability. Device dimensions (74mm × 47mm × 17mm) and weight (50 g) are also discrete so as not to impair sport performance.

Prior to use GPS units were issued and the prospective location of data collection named. This identifies the location for analysis purposes and is associated with longitude and latitude coordinates. On game days GPS units were turned on at least 30 min prior to game start to ensure sufficient time to acquire a 'satellite lock' from multiple sources. Upon game completion units were turned off and data were extracted using specialist software provided by the unit manufacturer (VX Sport Software 5.3.1, Wellington, New Zealand). Data were then trimmed to remove the initial satellite lock and warm-up periods, and splits were inserted to match chukka durations (min:sec) as per accompanying notational analysis. All trims (chukka durations) were the same per player (identified as Athlete in the dataset), per team, per game. Using the same software, distance, speed and high intensity variables of interest were selected (Table 1). These included maximum, mean and count values, with speed zones derived from an upper limit of 60 km/h, to provide a more detailed quantification of distance and speed parameters. Speed zones were as follows: Zone 1: 0–19.2 km/h; Zone 2: 19.2–23.4 km/h; Zone 3: 23.4–28.2 km/h; Zone 4: 28.2–47.4 km/h; Zone 5: 47.4–60 km/h. Following extraction of variables of interest, data were exported to microsoft Excel to facilitate data curation. Data are provided as Supplementary material and are categorised per variable (distance, speed, high intensity), with level of play stated under Goal.

Supplementary Materials: The following are available online at <http://www.mdpi.com/2306-5729/4/3/95/s1>.

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Conflicts of Interest: The authors declare no conflict of interest.

References

1. Hurlingham Polo Association. *Outdoor Rule and Regulations 2018*; Hurlingham Polo Association: Faringdon, UK, 2018; pp. 1–83.
2. Chanda, M.; Srikuea, R.; Cherdchutam, W.; Chairoungdua, A.; Piyachaturawat, P. modulating effects of exercise training regimen on skeletal muscle properties in female polo ponies. *BMC Vet. Res.* **2016**, *12*, 245. [[CrossRef](#)] [[PubMed](#)]
3. Gondin, M.R.; Foz, N.S.B.; Pereira, M.C.; Flagliari, J.J.; Orozco, C.A.G.; D’Angelis, F.H.F.; Queiroz-Neto, A.; Ferraz, G.C. Acute Phase Responses of Different Positions of High-Goal (Elite) Polo Ponies. *J. Equine Vet. Sci.* **2013**, *33*, 956–961. [[CrossRef](#)]
4. Ferraz, G.C.; Soares, O.A.B.; Foz, N.S.B.; Pereira, M.C.; Queiroz-Neto, A. The workload and plasma ion concentration in a training match session of high-goal (elite) polo ponies. *Equine Vet. J.* **2010**, *42*, 191–195. [[CrossRef](#)] [[PubMed](#)]
5. Best, R.; Standing, R. Feasibility of a Global Positioning System to Assess the Spatiotemporal Characteristics of Polo Performance. *J. Equine Vet. Sci.* **2019**, *79*, 59–62. [[CrossRef](#)]
6. Best, R.; Standing, R. Performance Characteristics of a Winning Polo Team. *New Zealand J. Sport Exerc. Sci.* **2019**, *2*, 1–11.
7. VX Sport metric Glossary. Available online: <https://support.vxsport.com/hc/en-us/articles/115006458148-VX-Sport-Metric-Glossary>. (accessed on 27 June 2019).



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