

Prescribing & Monitoring
Training
using Plasma Lactate

By

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Aims of Presentation

- Demonstrate how the art & science of training can be combined
- Promote the use of sports science methodologies
- Explain how owners, trainers & horses benefit from measuring the performance variable called plasma lactate

Introduction

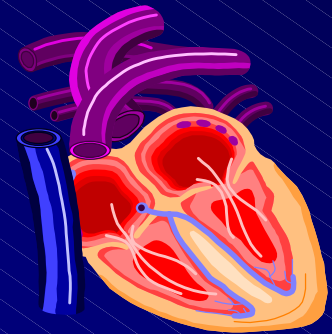
- PhD Program
- Mr Fred Kersley
- Australian swimming team
- Physiological information
- The equine industry

Aim of Training

- To win races
- Correct ratio of aerobic & anaerobic exercise
- Training for 3200 m Vs 1600 m race
- Clasification of various speeds
- Snapshot of current fitness status

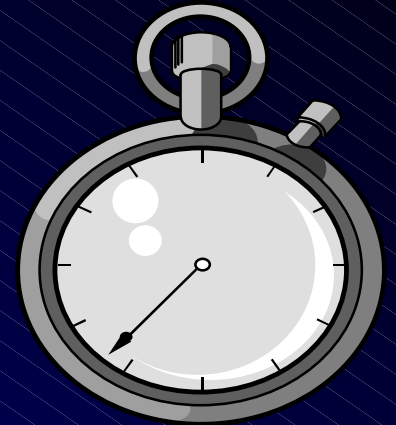
Energy Systems

- Anaerobic Systems
 1. Phosphagen system
 2. Lactic acid system
- Aerobic System
 3. Aerobic system



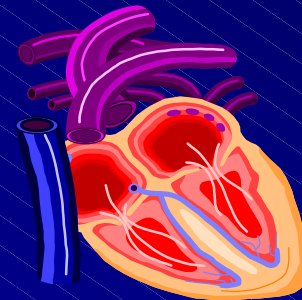
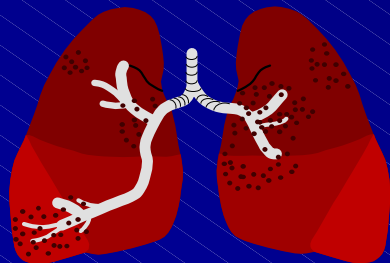
Race Model

- Start - Phosphagen system
- Middle phase - Aerobic system
- Last 800m - Lactic acid system (production)
- Finish - Lactic acid system (tolerance)
- Recovery - Aerobic system (clearance)

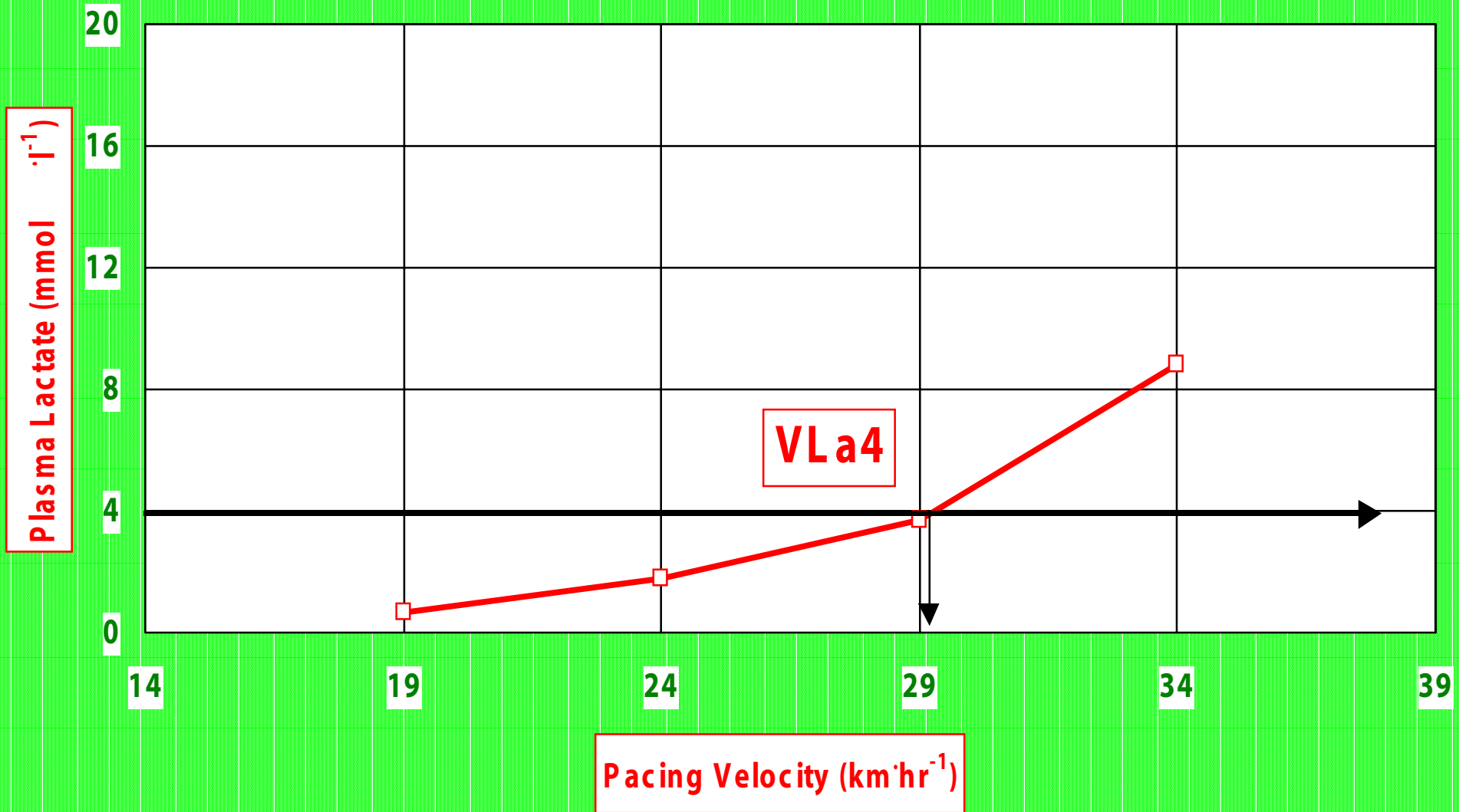


Standardbred Races

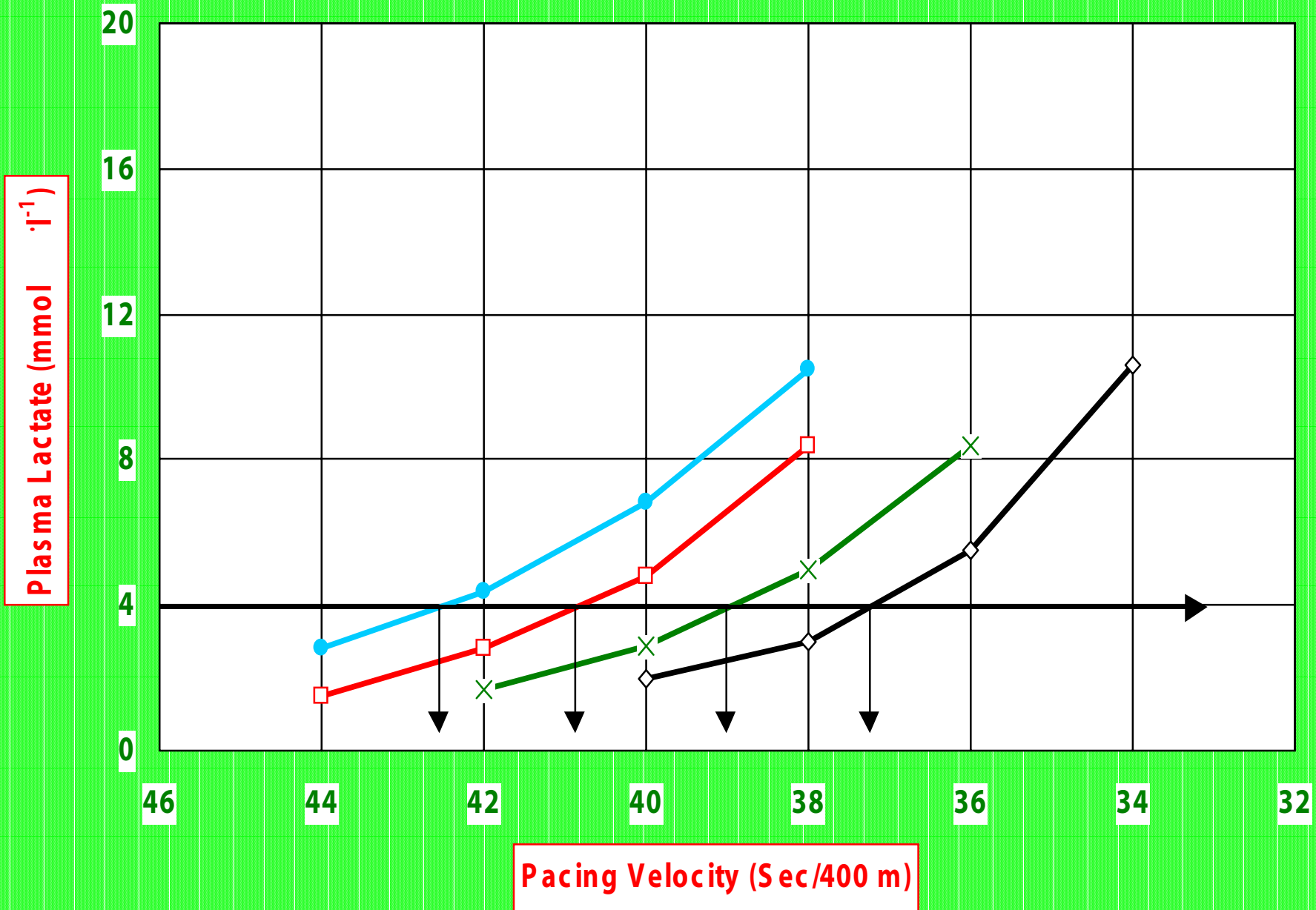
- Aerobic energy contribution - underestimated
- Higher and faster rate of increase in VO_2max
- Aerobic energy probably contributes greater than 70% of race energy



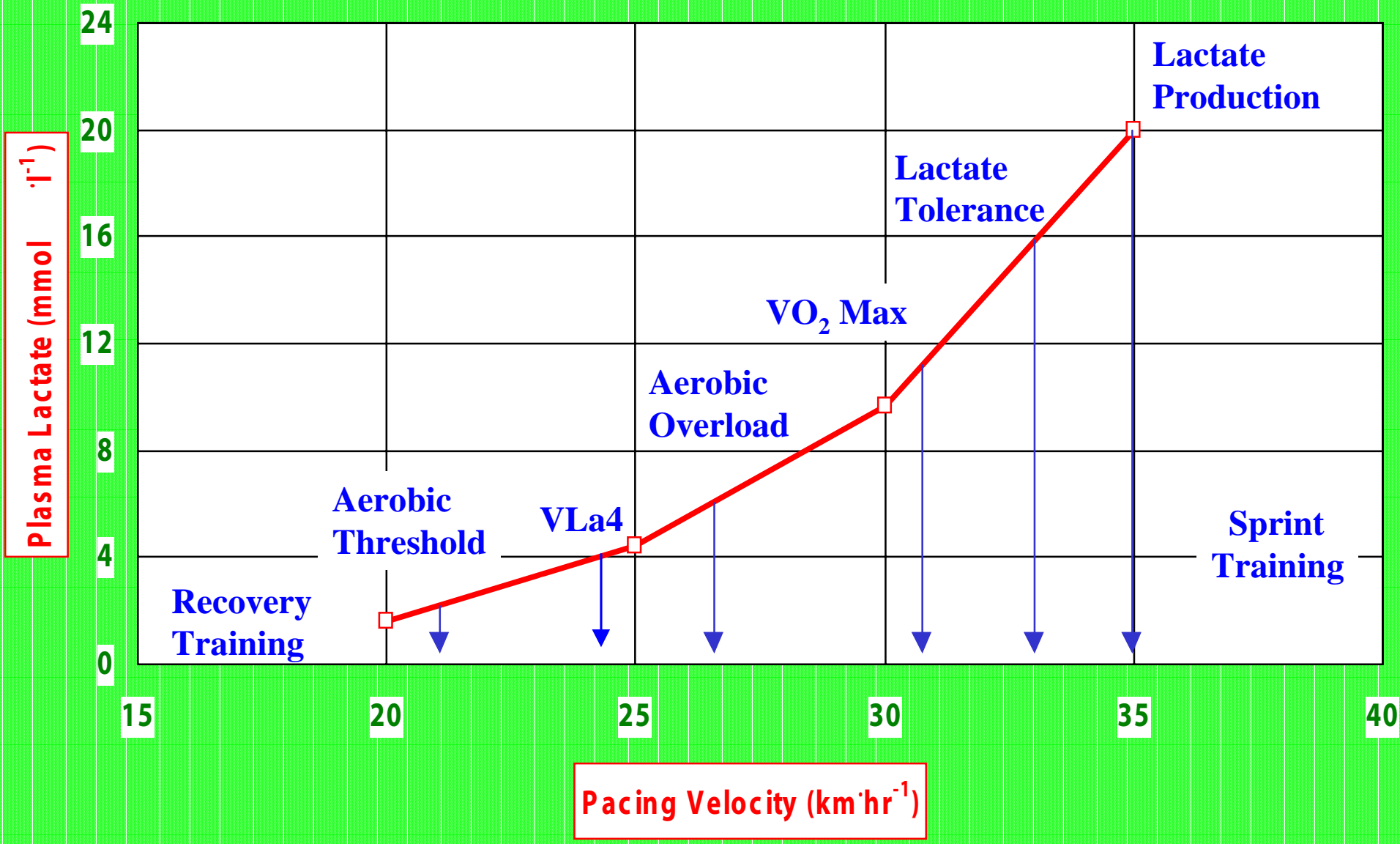
Lactate-Velocity Curves : 4 x 3-minute Profile (Treadmill)



Training induced changes in lactate kinetics



Training Velocities Corresponding to Lactate Concentrations between 2 and 20 Mm



Periodisation of Training

- Divide training program into smaller phases
- Each phase has specific objectives
- Specific types of training & associated lactate concentrations

Phases of training

- General preparatory : 8-weeks
- Specific preparatory : 4-weeks
- Pre-competitive : 4-weeks (trials)
- Competitive: 3-6months
- Transition : spelling

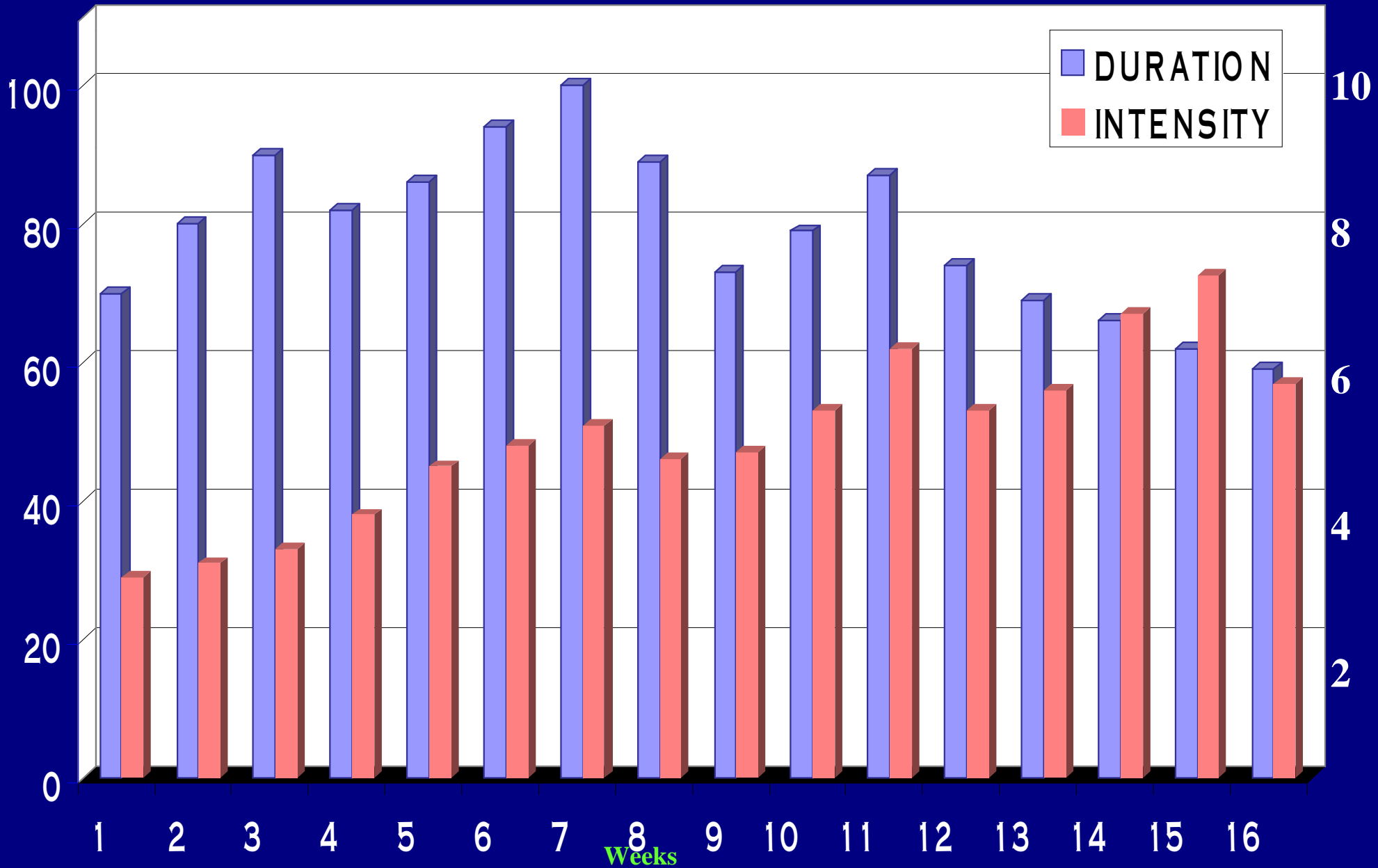
Training Terminology

	Types of training	Lactate	Workouts
GP	Recovery training	1-2 mM	1x20-min
	Aerobic threshold	2 mM	2x10-min
	VLa4	4 mM	3x5-min
	Aerobic overload	6-8 mM	3x4-min
SP	Maximal oxygen uptake	10-12 mM	3x3-min
	Lactate tolerance	14-17 mM	2x2-min
PC	Lactate production	20-25 mM	2x1-min
	Sprint training	3-4 mM	3x30 sec

Periodisation of Training

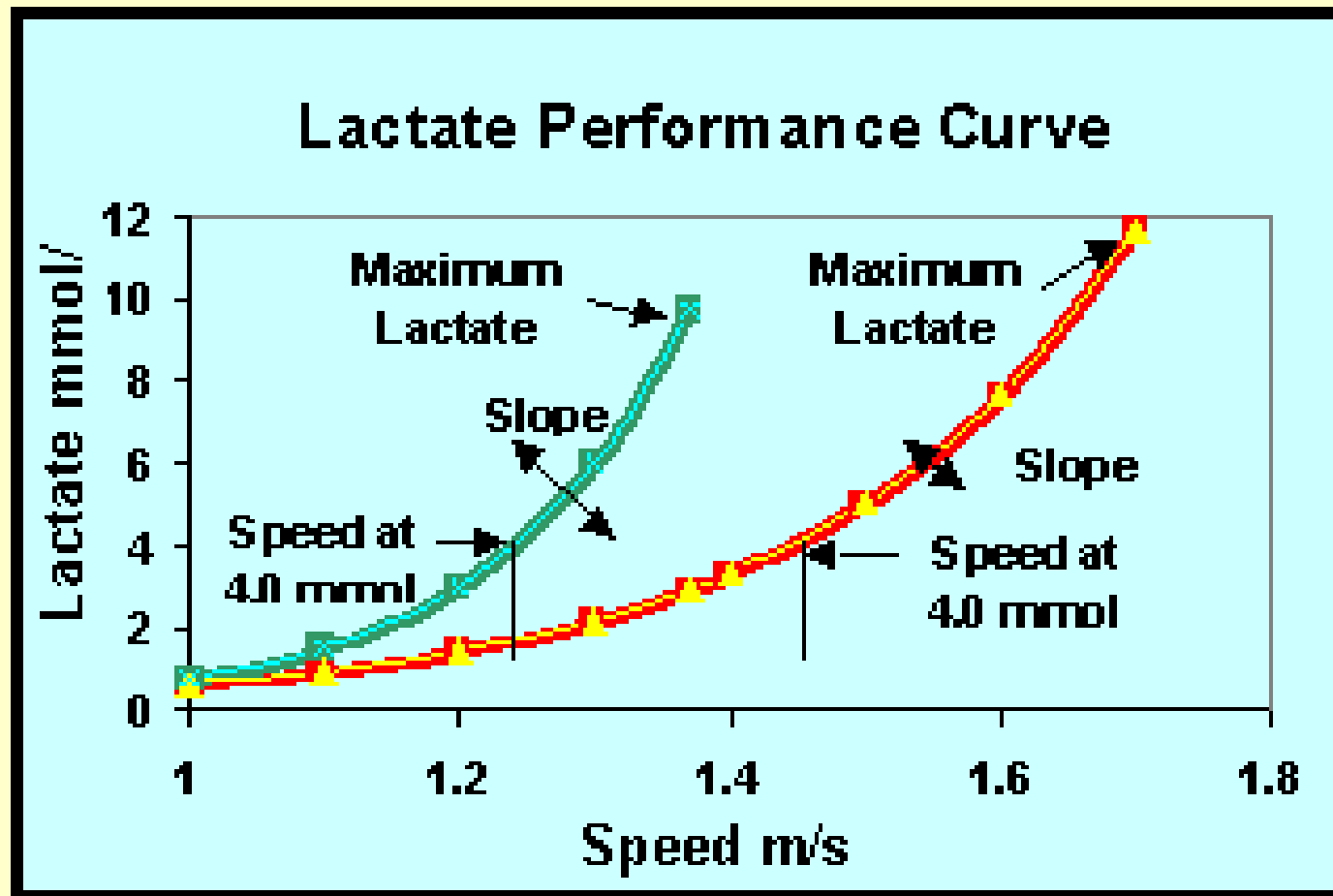
Minutes

mM



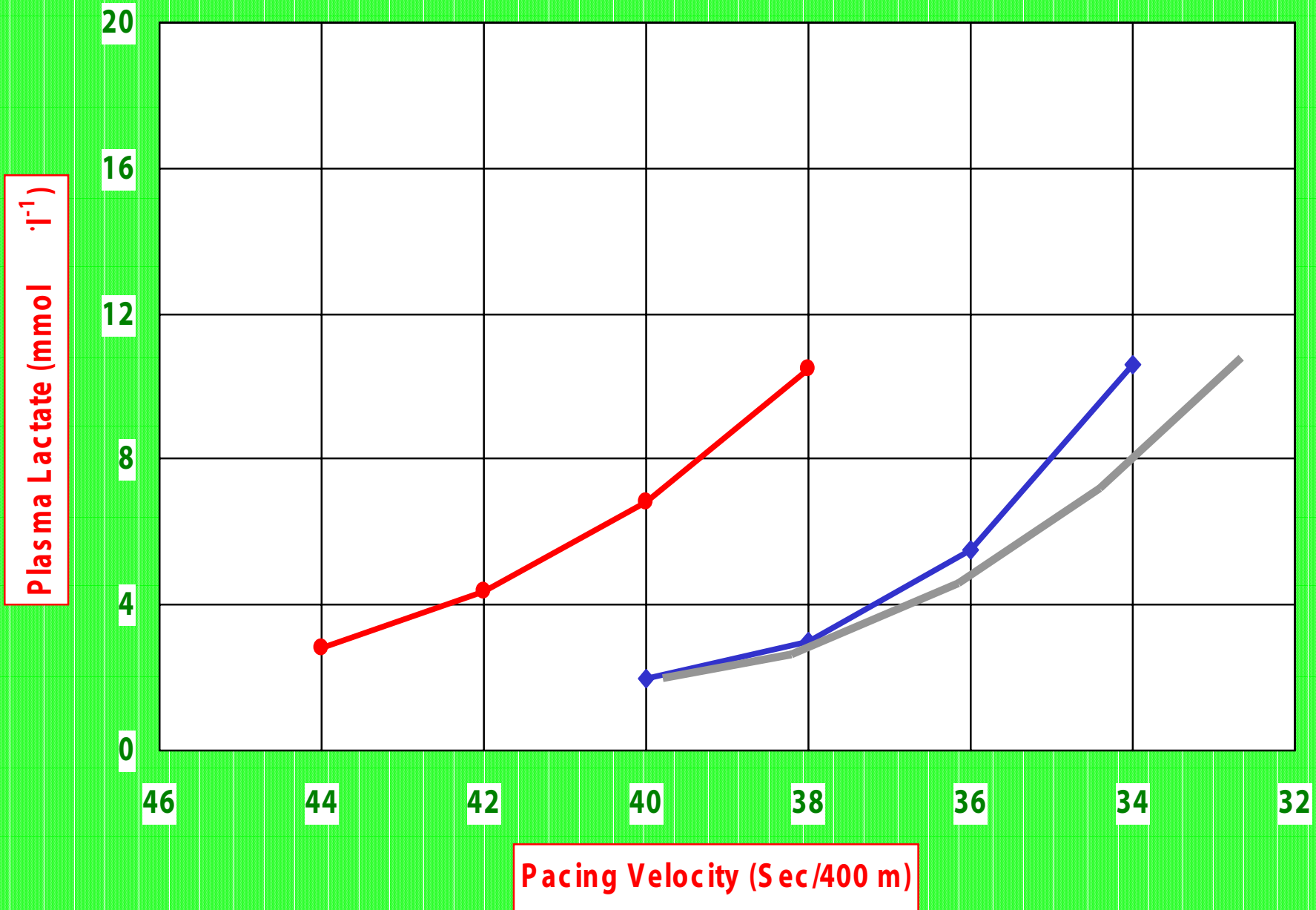
East German Protocol

- Each parameter reflected a different aspect of conditioning



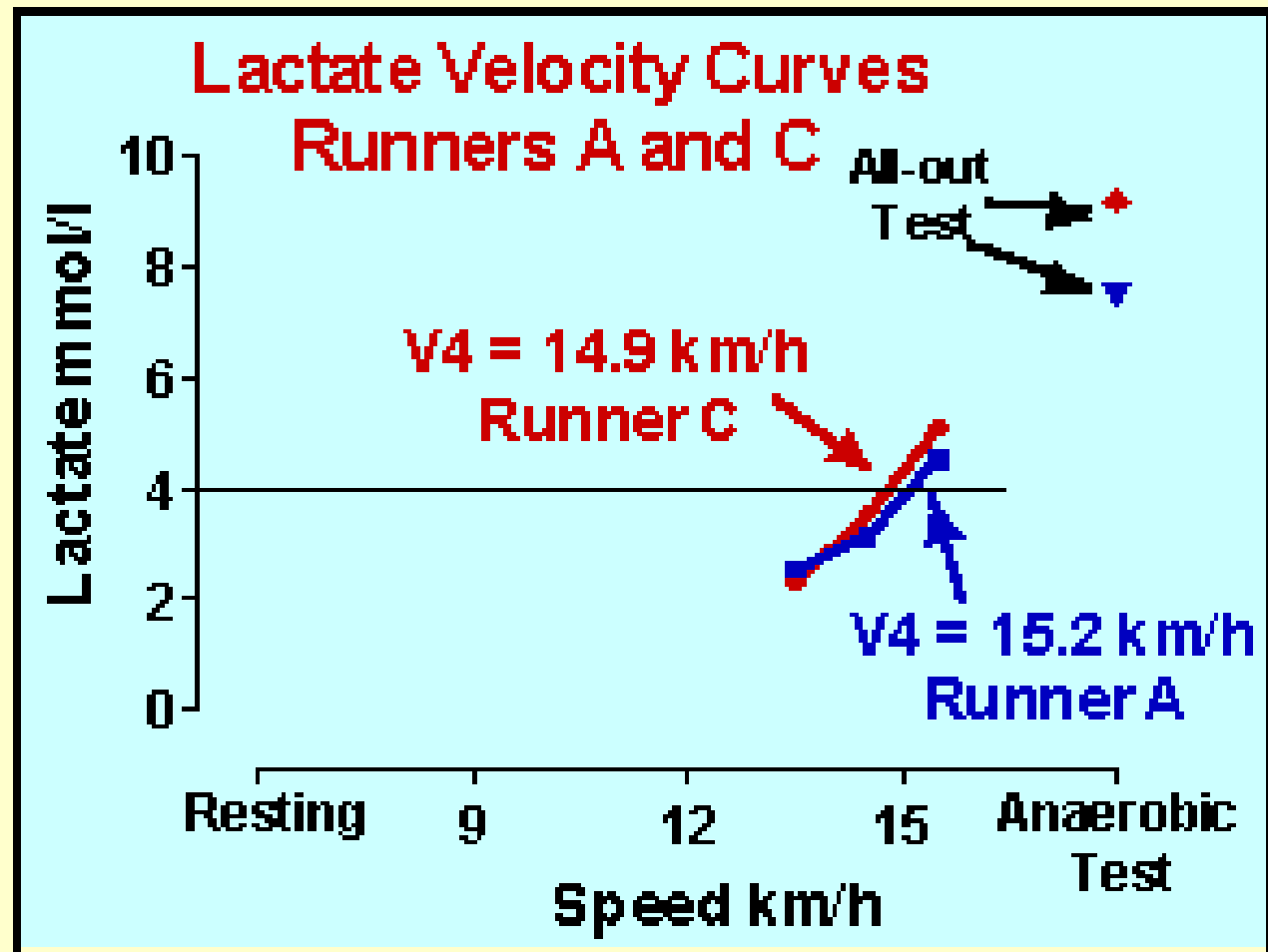
Lactate and Performance in Sport

Training induced changes in lactate kinetics



Conditioning Assessment

SLTP Test Running Runners		
	A	C
<u>Speed (km/h)</u>	<u>Lactate mmol/l</u>	<u>Lactate mmol/l</u>
13.5	2.5	2.3
14.5	3.1	3.5
15.5	4.5	5.1
Anaerobic Test	7.5	9.2



Lactate and Performance in Sport

Characteristics - Anaerobic Profile

- 45-90 seconds - maximum effort
- Time for 800m & collect blood samples 2 4 6 and 8 minutes post-exercise
- The faster the time, or the higher the maximum lactate concentration, the higher the anaerobic capacity
- Sectional times each 200m - speed rating

Performance Classification

Performance Ratings & Classifications		Aerobic system VLa4 Sec/400m	Anaerobic system 800 m Sec
3	Poor	43	61
4	Fair	42	60
5	Average	41	59
6	Good	40	58
7	Very good	39	57
8	Excellent	38	56
9	Superb	37	55

Fitness Ratings

Aerobic/Anaerobic Ratings

- $3/3 = 6$ Poor / Poor = unfit
- $6/4 = 10$ Good aerobic / Fair anaerobic
- $7/6 = 13$ Very good aerobic / Good anaerobic
- $8/7 = 15$ Excellent aerobic / Very good anaerobic

As fitness
progresses



Conclusions

1. Fitness profiling provides a performance assessment of the aerobic & anaerobic energy systems
2. Identifies ideal training velocities for various types of training
3. Demonstrates how each energy system has improved during the previous 4 weeks of training (Trainability)

4. Identifies which energy system should receive more attention in the next 4 weeks of training.

5. When the total performance score plateaus, an indication of the horse's overall genetic potential is obtained

Developing monthly plasma lactate curves reduces the guesswork associated with equine training

Combining the knowledge of the trainer & exercise physiologist enhances the training process

Acknowledgements

- Mr Fred Kersley
- Harness Racing Council