Performance science in elite track and field athletics and its support of world class coaching practice

Dr Barry Fudge – UKsem – November 2011
UKA Physiologist

- Employed by English Institute of Sport
- Deliver 100% UKA
- Based in Loughborough at the NPC
- Responsibility for all event groups but primarily endurance
Overview

Problem
Gap analysis
Intervention
Case study
The Problem

Endurance running
The Problem
The Problem – 2008 – 4 years to home Olympics

Mo Farah
- 13:08.11 (Rank 43) 5000m
- 27:44.54 (Rank 79) 10000m

Kenenisa Bekele
- 12:50.18 (Rank 1) 5000m
- 26:25.97 (Rank 1) 10000m

Something has to change!!!
Amazing result but not the Olympics!
Don’t lose sight of your goal!
Section main points

• 2008: Athletes from east African countries dominate endurance running

• Clock ticking to home Olympics: success required

• 2011: British athletes making progress but not accomplished goal

• Next sections detail one part of a massive process undertaken by UKA teams to change our fortunes (i.e. Coaches, athletes & support staff)
Gap analysis

East African running
PhD work program... Kenya running phenomenon

- Diet
- Hydration
- Physiological testing
- Genetics
- Physical activity & lifestyle
- Haematology
- Develop Technology
Long Term Athlete Development

- Correct genetic potential
- Correct environmental interaction
- Progression of key determinants
- Refinement of environment
- Testing
- Optimisation
- Marginal gains

Scientific Principles

English Institute of Sport
The “correct” genotype for elite performance is of course fundamental.

It is then the interaction of each genetic element with the environment that is likely to be a determining factor.

Kenyan athletes have a conducive environment for developing as an endurance runner...
Kenya – importance of location

Onywera et al, 2006
Ethiopia – importance of location

Scott et al, 2003

<table>
<thead>
<tr>
<th>Protocol Type</th>
<th>Natural-Altitude</th>
<th>Live High, Train High</th>
<th>Live High, Train Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elite</td>
<td>1.6; ±2.7</td>
<td>4.0; ±3.7</td>
<td>0.6; ±2.0</td>
</tr>
<tr>
<td>Subelite</td>
<td>0.9; ±3.4</td>
<td>4.2; ±2.9</td>
<td>1.4; ±2.0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Protocol Type</th>
<th>Enhanced</th>
<th>Natural-Altitude</th>
<th>Live High, Train High</th>
<th>Live High, Train Low</th>
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</thead>
<tbody>
<tr>
<td>Elite</td>
<td>5.2; ±4.1</td>
<td>4.3; ±4.1</td>
<td>4.0; ±5.5</td>
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<tr>
<td>Subelite</td>
<td>4.5; ±4.1</td>
<td>4.6; ±3.3</td>
<td>4.8; ±5.3</td>
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</tr>
</tbody>
</table>

Study characteristics changed by +1 SD or -1 SD for enhanced protocol
- altitude
- days exposure
- test day
- hours hypoxia
- days exposure
Piecing it all together

Altitude recommendations for endurance running
Section main points

• Typically the best endurance runners in the world are based at altitude
• Science appears to corroborate anecdotal evidence
• Altitude training may be a vehicle to optimally modify the aerobic phenotype
• But by no more than the limit set by an individual's genotype
• Generally altitude training required for world class performance in endurance running
Intervention: Altitude

Creation of a conducive environment
**Altitude Training Opportunities**

UKA and London Marathon are pleased to announce the 2012 altitude training camp programme for UK endurance athletes.

The UKA/London Marathon altitude camps have become an important fixture in the training programmes of the majority of leading UK endurance athletes, providing them with the opportunity to train at altitudes three to four times per year.

The established training bases in Fins Bay (France) and rim Kenya have provided the ideal environment for athletes and coaches to work together, supervised by a team of UKA staff including coaches, physiotherapists, doctors, and travel staff.

Building on the success of 2011, the UKA/London Marathon altitude programmes has continued to have a positive impact on endurance performances throughout the 2011 season, with highlights including Mo Farah's World Championships gold at 5000m and silver at 10,000m, Hannah England's World Championships silver at 1500m, Helen Clitheroe's European Indoor Championships gold at 3000m, and Arnold Counts' European Junior 1500m and James Stewart's 1500m silver at the European Under-23 Championships.

The UKA/London Marathon altitude training camps will continue to play an important role in the training and preparation phase of all the athletes who attend the camps.

**Description** (2012 altitude camps)  

<table>
<thead>
<tr>
<th>Description</th>
<th>Departure and return dates</th>
<th>Location</th>
<th>Closing date for expression of interest</th>
<th>G Altitude</th>
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</thead>
<tbody>
<tr>
<td>Winter Training Camp</td>
<td>Depart: 19 January 2012</td>
<td>Iten, Kenya</td>
<td>15th November 2011</td>
<td>4 weeks</td>
</tr>
<tr>
<td>(Interim/Camp Leopoldine)</td>
<td>Return: 8 February 2012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Training Camp (also available to WOCFP athletes)</td>
<td>Depart: 19 January 2012</td>
<td>Iten, Kenya</td>
<td>15th November 2011</td>
<td>4 weeks</td>
</tr>
<tr>
<td>Return: 8 February 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Marathon Training Camp</td>
<td>Depart: 15 March 2012</td>
<td>Iten, Kenya</td>
<td>15th January 2012</td>
<td>4-6 weeks</td>
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<tr>
<td>(also available to WOCFP athletes)</td>
<td>Return: 17 April 2012</td>
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<tr>
<td>Spring Training Camp</td>
<td>Depart: 13-14 April 2012</td>
<td>Font Romeu, France</td>
<td>15th February 2012</td>
<td>3-4 weeks</td>
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<tr>
<td>Return: 1-17 May 2012</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Summer Training Camp</td>
<td>Depart: 24 June 2012</td>
<td>Font Romeu, France</td>
<td>N/A</td>
<td>3-4 weeks</td>
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<tr>
<td>(Preparation camp for London Olympics)</td>
<td>Alternative departure/return dates for London League and London Olympics</td>
<td>N/A</td>
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<tr>
<td>Winter Training Camp</td>
<td>Late October to early December 2012</td>
<td>Iten, Kenya</td>
<td>11th</td>
<td>4-6 weeks</td>
</tr>
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</table>

If you have any questions on the above please contact:  
UKA National Endurance Manager - Spencer Barden  
by email sbarden@ukafa.org.uk
## Altitude model aims

<table>
<thead>
<tr>
<th>Type</th>
<th>Aim</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Improve general fitness – especially aerobic capabilities</td>
<td>21-28 days</td>
</tr>
<tr>
<td>B</td>
<td>To prepare for high intensity training following altitude</td>
<td>21-28 days</td>
</tr>
<tr>
<td>C</td>
<td>Improve competitive performance</td>
<td>17-21 days</td>
</tr>
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</table>
Optimal training camps

High enough for blood adaptation

Low enough to train when quality required
Multiple altitude locations are required
Altitude – mixed strategy
Altitude Training Camp:

Information and recommendations for coaches and athletes

Contents:

- Things to do pre-altitude camp
- Things to do when at altitude
- Things to do post-altitude camp
However beautiful the strategy, you should occasionally look at the results.

Winston Churchill
Section main points

• Mixed altitude strategy in order to provide coaches the best possible opportunity to prepare their athletes for the world stage

• Coach education and testing essential

• Multiple training venues required

• Multiple exposures required for most athletes

• Other benefits important

• Training camp effect
General summary

- Correct environment is required to realise true genetic potential
- UKA altitude program aims to provide a conducive environment for adaptation
- Program relatively successful but no cigar
- Physiology service provides coaches with objective data regarding their program
Thank you for listening!

barry.fudge@esi2win.co.uk