Tokyo 2020 Olympic & Paralympic Games
Climate Mitigation
WARM UP

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Plan of Presentation

• Principles of warm up
• What factors affect warm up
• Specific warm up challenges for Tokyo 2020
Why Warm Up?

• Prepares the body for exercise
  – optimise performance
  – reduce the risk of injury

• Physiological and Psychological

• Should take place for any training session
What do we need for maximal performance?

• Max efficiency muscles
  – easy contraction/stretching
  – rapid supply of energy
  – more efficient energy supply

• Max coordination
  – speed of transfer of information
  – speed of detection
What does warm up do?

• ↑ body, muscle, blood temperature
• Improve blood flow
• More efficient oxygen transfer and use
• Improve cooling efficiency
• Improve flexibility
• Improve psychomotor skills
• Protects muscle, tendons and ligaments
Structure of a Warm Up

• **Passive warm up** *(rug/warm environment)*
  – externally increase body temperature

• **General warm up**
  – nonspecific movements

• **Specific warm up**
General Warm Up

• 5-10 mins gentle movement
• Gradual increase in intensity
• 50% VO$_{2\text{max}}$
• Energetic walk, gentle trot, slow canter

↑ stifle ROM after 10 min general warm up.
Northrop et al. 2011
Specific Warm Up

• Practice specific movements with increasing intensity
• Duration dependent on whether
  • Training session
  • Competition
  • Type of competition
Preparation for Competition Movements

• Practice specific movements required
  – Proprioceptive conditioning
  – Mental preparation
  – Muscle/tendon conditioning
  – Joint ligament flexibility
Preparation of movements

• BUT only small amount of each movement – not to fatigue
Threshold of intensity vs performance

Jumping 1.35m
- ↑ Number jumps  →  ↓ competition performance
- ↑ Height of fences  →  ↑ penalty points

Stachurska et al. 2018

Dressage
- Warm up duration ↑ performance up to threshold
- then ↑ intensity  →  ↓ competition performance

Murray et al. 2006
Excessive repetition of individual movements

• Risk of muscle glycogen depletion/fatigue
• Reduced performance
• Potential for injury
• Overheating – particularly of muscles
Overtraining during Warm Up

- Lack of rider confidence
- Tension/lack of experience
- Insufficient preparation
- Warm up not adapted to conditions
  - Fitness
  - Temperature/Humidity
  - Weather
  - Ground conditions

Muscle glycogen depletion
Factors affecting Warm Up

• Individual athlete’s capability
  – Physical (age, experience, flexibility)
  – Mental

• Environmental influences
  – Distractions
  – Temperature/humidity
  – Ground conditions
Warm up in cold

- Muscles colder – weaker, tire earlier
- ↑ Warm-up time
- ↑ Length of low-intensity General warm-up
Warm up in heat

• Body temperature increases more rapidly → reduce warm up time
• Warm-up in the shade if possible
• Cooling + Drinking
• 3 x 15 min versus 45 min
Ground conditions
What is usual warm up practice?

• Dressage
  • 34 min (max 1 hour) – reports of 60 mins

• Jumping (12 min +)
  • 1st round 18, 22-27, 37 min 12, 13 jumping efforts
  • 2nd round approx 32 min 9 jumping efforts

• Approximately 2/3 time spent in trot and canter

Tokyo 2020: Factors to take into account

• Climatic conditions
• Distance from stables to warm up
• Warm up to arena
• Time in day for training and warm up
• Surfaces?
Recommendations

• In shade/cool before warm up

• Precooling?

• Rest periods in shade
Recommendations

• Shorter total warm up time

• No passive warm up required
  • Consider pre-cooling

• ↓ General warm up duration

• ↓ Specific warm up duration

• For excited horse – use earlier session + shorter competition warm up?
Recommendations

• General warm up reduced

• Specific warm up reduced
  • ↓ number jumping efforts
  • ↓ time in high intensity movements
Recommendations

• Split warm up into approx 15 min periods
  • Rest in shade
  • Assessment
  • Cooling if necessary
Feasibility of cooling in the warm up

- Muscle gets the hottest
- Skin cools the quickest
- Rectal continues to ↑ after exercise even with cooling
  - takes time for heat to transfer from muscle to blood to rectum
- After 6 min cooling, muscle and rectal still above resting

POTENTIAL FOR COOLING IN WARM UP
Recommendations

• Monitoring
  • Fatigue: how does the horse feel?
  • Respiratory features
    • Respiratory rate at rest stop
    • Regularity of breathing pattern
    • Depth of breathing
  • Sweating
    • Type and distribution
Warm up on consecutive days

• Cumulative fatigue?
• Too much warm up day 1 - ↓ performance day 3
Clothing
Warm up: Take home messages

*Take into account the climatic conditions*

- Reduce Duration and intensity
  - General warm up
  - Specific warm up

- Break warm up into smaller sections
  - Rest
  - Cooling
  - Monitoring