#### Ten Things That Helped Make My Team World Champions





















### 1. The Power of Fat





Bjørn Dæhlie: VO2 max 93 ml/kg/min Reynolds AJ, Hoppler H, Reinhart GA, Roberts T, Simmerman DA, Weyand P, Frank DA, And CR Taylor. "Sled Dog Endurance: A Result oHigh Fat Diet or Selective Breeding? #5775 F.A.S.E.B. Atlanta, April 1995.





Elite sprint sled dogs: VO2 max 240 ml/kg/min



#### Effect of Fat Intake on VO2 Max



#### Effect of Fat Intake on Max. Fat Oxidation



#### Effect of Fat Intake on Mitochondrial Volume



## Work: Energy Substrates

#### Fat:

Ingestion of a high fat diet during training alters metabolism to favor endurance

increased circulating FFA
increased VO2 max
increased max rate fat oxidation
increased mitochondrial density
muscle glycogen sparing

## High fat diet:

- Bottom Line;
  - Dogs fed a high fat diet can run faster and longer than dogs fed a low fat high carbohydrate diet



## Energy: Fat

• Dietary intake:

- Training- 30-60% of Kcal
- Racing: up to 80% for short periods of time (<2 weeks)</li>

## 2. Recover with carbohydrates



# Muscle glycogen

- Stored form of carbohydrates
- Important for maintaining top speeds
- 1967 Bergstrom
  - High carb diet with training increased MG
  - Pre-exercise MG highly correlated with performance
  - "carbohydrate loading"

#### Glycogen Store Drop in Human Athletes Who Exercise Successive Days

•On days 2 and 3, the runners were unable to replete their glycogen stores

• Perception of fatigue by the runners was increased and time to finish the run was longer on day 3

•MG still not recovered to pre day 1 levels after 5 days of rest



# Glycogen Repletion Over 24 hrs with Maltodextrins

PERCENTAGE OF GLYCOGEN REPLETION VS. TIME<sup>1,4</sup>



## Energy: Carbohydrates

• Dietary Carbohydrates:

- Important for post exercise recovery of glycogen stores
- 1.5-2 g/kg body weight

- Administer within 30 minutes post exercise

## 3. Maintain Hydration to optimize performance: water loading with glycerol



## **Roles of Water**

- Solvent
- Transport medium
- Shock absorber
- Lubrication
- thermoregulation

#### Problems associated with dehydration

• Increased cardiac workload

• Impaired delivery of nutrients

• Impaired thermoregulation

## Water balance: water out

• Sweat?

• Respiration

Salivation

• Urination

• Feces





### Water Balance: Water in

• Water (40-80%)

• Food (10-70%)

• Metabolic water (10%)

## **Hydration Strategies**

- Wet foods

   Soaking dry food
   Fish, meat
   Frozen treats
- Baited water
- Electrolytes?
- Glycerol



# Glycerol

• 3 carbon alcohol

• Normal component of fat

• Sweet, sticky odorless fluid

### Strategies for Hydration: Glycerol

 1 L of a 1% Glycerol solution once a day w/remaining water untreated vs equal volume of total water intake:

- 30 miles -30 F 3 days in a row
- No change in TBW in glycerol treated dogs
- 5% decrease in TBW in untreated dogs

### Strategies for Hydration: Glycerol

• Loading dose 30 cc glycerol per liter water the night before a multi-day event

 Then 1% Glycerol in morning 3-4 hours before each day of competition with remaining water untreated

### Strategies for Hydration: Glycerol

• Benefits:

- Better Hydration
- Lower Exercising Body Temp
- Better Appetite
- Better Recovery


### 4. You can't win if you're not healthy



# **Exercise and Immune Function**

• How does exercise affect the function of the immune system?



# **Exercise and Immune Function**

 Moderate exercise improves immune function

• Extremes of exercise impair immune function

# **Exercise and Immune Function**

- The immune system is the first to suffer when inadequate nutrients or recovery time are provided
- Breathing hard in cold air decreases local immunity (secretory IgA) and increases incidence of upper and lower respiratory tract infections

# Effect of exercise on immune function (adapted from Keast 1996)





# What are probiotics?

 Live microorganisms obtained via foods or supplements that, when consumed in sufficient quantities, provide health benefits to the host

Proposed health benefits:

- •Maintain GI health
- •Promote immune health
- •Reduce allergy
- •Manage diarrhea



# Common Probiotic Organisms

- Lactobacillus
  - johnsonii
  - casei
  - rhamnosus GG
  - reuteri
- Bifidobacterium
  - bifidum
  - lactic
- Enterococcus
  - faecium (SF68)

- Bacillus
  - subtilis
  - cereus
  - licheniformis
- Pediococcus
  - pentosaceus
- Saccharomyces
  - cerevisiae
  - boulardii



#### Longitudinal Analysis

Diarrhea resolved more fuels of the store of the store significantly different \*Based on high the store of 7 days, since some dogs did not resolve, value for placebo and true difference is greater

# Colostrum Stimulates GALT to Increase Secretory IgA



Animals fed diet with colostrum demonstrated enhanced local immune status

#### **Colostrum Enhances Immune Status**





Animals fed diet with colostrum demonstrated enhanced immune status – CDV response is stronger & lasts longer

CONFIDENTIAL

# Periodization of exercise and diet maximizes response to your conditioning program





#### **Energy Source Comparisons Distance Running Events**

"Classic" Model							
Energy Source 4	00 80 0	15	50 50	00 10	000 Mar		
Aerobic (%)	18.5	35.0	52.5	80.0	90.0	97.5	
Anaerobic (%) <u>"Current" Mode</u>	81.5	65.0	47.5	20.0	10.0	2.5	
Energy Source Aerobic (%)	400 43.5	800 60.5	1500 77.0	5000 94.0	10000 97.0	Mar 99.0	
Anaeropic (%)	50.5	39.5	23.0	6.0	3.0	1.0	

Note: "current" model determined using the latest methodology in oxygen kinetics, and with a much more elite subject population than the "classic" model.

CADAR

# Polarized Training – **Norwegian Approach**

#### Norwegian Endurance Successes (population 4.6

million)

303 Total Medals in Winter Olympic Games (with ~60% from XC Skiing & Speed Skating) VS.

253 Medals in Winter Games for USA; 145 Medals in Winter Games for Canada; 308 Medals in Winter Games for USSR/Russia



**Bjorn Daehlie** 8-time Olympic Champ 9-time World Champ 29 Olympic & World **Champs Medals from** 1991-1999 yyyy-mm-dd







Ingrid Kristiansen **World Champs Gold** 2 European Champs 5 World Records (5000m To Marathon)

**Grete Waitz Olympic Silver World Champs Gold** 4 World Records 9-Time NYC Marathon Winner NRC/dpt - name/

Johann Olav Koss 4-time Olympic Champ 3-time All-Around World Champ **10 World Records** 

#### Polarized Training – Norwegian Approach

Seiler et al. Intervals, Thresholds, and Long Slow Distance: the Role of Intensity and Duration in Endurance Training. Sportscience 13, 32-54, 2009, 2009

K. Stephen Seiler, Glenn Øvrevik Kjerland. Quantifying training intensity distribution in elite endurance athletes: is there evidence for an "optimal" distribution? Scand J Med Sci Sports 2006: 16: 49–56

#### Lactate Threshold training model -

- Emphasizing training between the first and second lactate/ventilatory thresholds.
- Lower training volumes, higher intensities
- Most 'running' done at or near threshold

#### Polarized training model -

-Emphasizing a large volume of training below the first lactate or ventilatory threshold combined with significant doses of training with loads eliciting 90– 100% of VO2max.

- Larger training volumes
- Some work done at threshold



# Periodization

Manipulation of training variables to maximize capacity and performance

#### > Type of exercise

Volume, intensity, type of activity: training vs competition

#### ➢ Timing of exercise

➤Throughout the year

- ➤Within a time of the year
- ➤Within an exercise bout







Incredibly diverse and varied training stimuli that needs to be planned and periodized on a daily/weekly/micro-cycle macro-cycle and yearly basis











### Periodization: throughout the year

- Periods of Conditioning
  - Foundation
    Preparation
    Specialization
    Transition/ Recovery

# Periodised nutrition for periodised training



NRC/dpt - name/

# Periodization: throughout the year

#### ➢ Foundation

- > 16-20 weeks, Summer-early fall
- Iarge volume, low intensity = LSD, building the aerobic foundation the rest of the training platform is constructed upon
- small amounts high intensity after 4-8 weeks for fun
- Wheel training (1.5 -2 hours/session @13 km/hr, total 700-1,000 km) swimming and free running











#### Foundation

- High fat minimum 30, optimum 40 50% of Calories (20-30% dry matter)
- High quality protein minimum 25% kcal better if more, emphasis on quality here
- ➤ Moderate carbohydrates- 30-40% kcal is OK
- Vitamins and minerals- balanced

High quality commercially available performance ration works well here

# Periodization: throughout the year

#### Preparation period

> 12 -16 weeks, fall thru early racing season

> Moderate volume with higher intensity :

> most sessions at or just below Anaerobic Threshold

➤ still hit on LSD training every 10-14 days to maintain aerobic base

- ATV, sled runs (5 to 20 miles) Wheel training for LSD 1.5-4 hours), "pace" interval runs every 7-10 days, some racing for practice
- > This is the most difficult period-stay focused on goal!

#### Preparation period

≻ High fat- 40-60% kcal (25-35% dry matter)

- High quality and amount of protein- 30-40% kcal +/or dry matter, animal sources
- Moderate carbohydrate 15-25% kcal+/or dry matter. Low carbs induces glycogen replacement mechanisms for supercompensation later

#### Preparation period

Vitamins and minerals-balanced for diet

> Antioxidants- adequate NOT supplemental amounts

Fiber add pysillium ½ t or 2 g per dog per day

#### Dave Partee/SledDogStudio.com

#### Periodization: throughout the year

Specialization period: Peak Period

4-7 weeks duration depends on how long aerobic base and peak mental state can last

> sharp decrease in volume, highest intensity

Races , high speed and pace intervals, short pace runs (12-16 miles), lots of REST!

### Nutritional Periodization: Specialization Period

- Energy nutrients, fiber, vitamins, and minerals- same as preparation period
- > Antioxidants- begin supplementation
  - Astaxanthin= 2-8 mg/dog/day
- Immune modulators
  - Hyper-immunized egg powder
  - ≻Colostrum,
  - ➢ Probitics

- > Specialization period:
- Post-exercise carbohydrate replacement
  1.5-2 g/kg
  - > Within 30 min post exercise
  - ONLY after race heats and last hard workout before peak races

- > Specialization period:
- ➢ Glycerol for "water loading"
  - ➤ 30ml/L the night before first heat and/or 10ml/L morning of first heat and then
  - ➤10 ml/L in the morning before each heat
  - >Then water as usual remainder of each day

## Periodization: throughout the year

#### ➢ Recovery or Transition period

- ≻4-8 weeks
- Focus on non-specific tasks and fun tasks
  - ➢ free play
  - ➤obedience training,
  - ➢leader training
  - Mental and physical rest and recovery
  - ► THERE IS NO OFF SEASON !

#### ➢ Recovery period

Nutritional goal - repair damage and replace depleted nutrient stores

Requirements same as foundation period- can be met by high quality commercial ration
Recovery time is AS or MORE important a determinant of performance than time spent exercising



#### Approaches to recovery

 Optimize physical and mental recovery to support optimal performance across multiple performance events.

• Apply concepts with proper timing to maximize recovery

#### Approaches to Recovery

- The "Whole Dog" approach
  - Mental recovery
    - Rest
    - Stress reduction
  - Physical recovery
    - Replenish nutrient stores
    - Support hydration
    - Remove waste products and prevent injury

### **Recovery:** Timing

- Timing as important as actions
- Improper timing can impair effect of action and even impair recovery
  - Examples:
    - timing of post exercise supplements
    - timing of hydration strategies

#### **Recovery:** Phases

- Recovery approached differently during different phases of preparation and performance.
  - Between bouts of training
  - While peaking
  - Between performance bouts within an event
  - Between performance bouts across events separated by days or weeks
  - Post performance (end of season)



#### 7. Feeding for optimal BCS is an art form; maintaining optimal BCS is essential to performance success



#### **BODY CONDITION SYSTEM**

Ribs, lumbar vertebrae, pelvic bones and all bony prominences evident from a distance. No discernible body fat. Obvious loss of muscle mass.

Ribs, lumbar vertebrae and pelvic bones easily visible. No palpable fat. Some evidence of other bony prominence. Minimal loss of muscle mass.

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Ribs easily palpated and may be visible with no palpable fat. Tops of lumbar vertebrae visible. Pelvic bones becoming prominent. Obvious waist and abdominal tuck.

Ribs easily palpable, with minimal fat covering. Waist easily noted, viewed from above. Abdominal tuck evident.

Ribs palpable without excess fat covering. Waist observed behind ribs when viewed from above. Abdomen tucked up when viewed from side.

Ribs palpable with slight excess fat covering. Waist is discernible viewed from above but is not prominent. Abdominal tuck apparent.

Ribs palpable with difficulty; heavy fat cover. Noticeable fat deposits over lumbar area and base of tail. Waist absent or barely visible. Abdominal tuck may be present.

Ribs not palpable under very heavy fat cover, or palpable only with significant pressure. Heavy fat deposits over lumbar area and base of tail. Waist absent. No abdominal tuck. Obvious abdominal distention may be present.

Massive fat deposits over thorax, spine and base of tail. Waist and abdominal tuck absent. Fat deposits on neck and limbs. Obvious abdominal distention.

The BODY CONDITION SYSTEM was developed at the Nestlé Purina Pet Care Center and has been validated as documented in the following publications:

Mawby D, Bartges JW, Moyers T, et. al. Comparison of body fat estimates by dual-energy x-ray absorptiometry and deuterium oxide dilution in client owned dogs. Compendium 2001; 23 (9A): 70 Laflamme DP. Development and Validation of a Body Condition Score System for Dogs. Canine Practice

July/August 1997; 22:10-15 Kealy, et. al. Effects of Diet Restriction on Life Span and Age-Related Changes in Dogs. JAVMA 2002; 2001/1215 1220



#### 8. Timing is everything



### Timing

- Before Exercise:
  - Temperature
  - Nutrient utilization
  - Fecal bulk
  - GI distress
- After Exercise
  Glycogen repletion

# 9. Always be willing to learn, anticipate, and adapt rather than react



## 10. Nothing beats experience and a great team!







#### **MISSION ACCOMPLISHED!**

SPORT



#### 66-year-old Roxy Wright wins fourth Open North American Championship

By Brad Joyal IS NOT A DOWNLOW DO NOT THE OWNER OF THE OWNER OWNE

it's a conseduct tale with add nock home her first of action. the makings of a movie. Sictury since the swept After retiring from the Rondy and OKAC in ing in 1996, Fairbanks "B'abeen like a fairy tale, suchs of racing. native Roky Wright winning the Renderston of her rereaghable career again," and Wright, who

Farmer Liver.

Streeper, who entered the three muchs age, her first

Roudy title in 24 years weekend as the defend-and fourth overall ing ONAC champion. and fourth overall. throughout the three days. On Surday, the 66-year-

> At Bould, the two terry nock and nack through unit the three days and 75 Although Wright bestod

wrote the final chapter and then North American Birreper by roughly be-minutes at the Roughly the minutes at the Rough the when the paptured her also earned ONAC titles ONAC proved to be much is 1989 and 1992. "When doses

Assertional Charopsenships I retired in 1996, I never In fast, Wright entered table on Suppley at the Jeff intended to cause back the faul heat with just a Wright started test the great honor and privilege came out on top with Wright charted out the sense by shound the Par Eucleron on Open Workh Charmon son Open Workh a three-day total time of

Top: Fana flank the starting gate at the Jeff Studdart Racegrounds as Ricey Wright, of Fairbanks, begins the final heat of the 2017 GCI Open North orrigan Championships on Sunday. Wright was her fourth title, beating Buddy Streeper and Lina Streeper, who took seened and third. Bottom: While dog mushers raced around trails north of Fairbanks. Studdert Racegrounds and run. I never thought 10-second advantage over contestants in Fairbanks Arts Association's Parka Parade took center stage. chand Muchery Hall on Td be back out here racing the defording champson. Categories included children, what cloth and what for any and winning again. It's a lin the end, through, the access score port the series and score access.

took second with a total 940076. heat as 94-01.7. Streeper, a Fort Neison. tame of 224.05 % He fu-British Columbia, native, ished the third heat in

ONAC+ 54

Fairbanks native Englund wins gold at

2017 Iditarod awards: Abbott claims Red t \_\_\_\_ Power named most inspirationa

