Evaluation of a Fitness Assessment and Conditioning Program in a Military Working Dog

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MWD Physical Demands

- Physical Requirements of the Working Dog
  - Patrol Duties
    - High-energy, sprinting speeds, spinal compression/lateral flexion (bite work), hind limb propulsion (leaping), fast sharp turns, low-grade intermediate-distance work
  - Detection Duties
    - Unstable terrain, lower-intensity endurance work, “hupping” and jumping in and out of vehicles or for high search, crawling/navigating tight spaces, maintain olfactory acuity for up to hours
  - Environmental Extremes: Heat injury, cold injury, trauma

Musculoskeletal Injuries in MWDs

- 2001 Study (Moore and others):
  - Evaluated 927 MWDs for causes of death or euthanasia; orthopedic and spinal cord diseases were 2 of 3 most common causes
  - Total of Orthopedic and Spinal Cord Disease (~35%)

- 2007 Study (Evans *et al*):
  - 245 MWD records evaluated for causes of discharge from duty. For dogs 5 years and older:
    - Spinal Cord diseases and/or Arthritis: 56.3% of discharges

- 2013 Parr and Otto
  - Police GSDs: Orthopedic injuries >25% police dog visits to ER and visits were at younger age vs. pet GSDs

- 2014 Takara
  - MWD non-combat injuries in Iraq (2009 and 2010): 14.3% musculoskeletal (4th most common injury type)

Musculoskeletal Injuries of Military Working Dogs

Contributing Factors:

- Breed/Genetics – conformation AND drive
- Kennel Environment
- Cyclic, repetitive loading
  - Lumbosacral joint (hupping)
  - Biceps/shoulder tendinopathies (jumping down)
- Traumatic tissue load to failure
  - Carpal hyperextension – jump from high
  - Torque under high strain – sudden turn with limb caught
  - Rapid eccentric load
  - Sudden onset of high-intensity exercise
- Navigating hazardous/unstable terrain

Musculoskeletal Injuries of Military Working Dogs

Bottom Line:

Orthopedic and neurologic injuries represent a large proportion of causes of death/discharge from duty or prolonged recovery of military working dogs.

*Even for dogs returning to duty, orthopedic surgery and rehabilitation can result in 3 months **MINIMUM** out of duty, and cost at least $5,000-$7,000 per patient*

Prevention!!!

Conditioning For Injury Prevention: Human Athletes

Neuromuscular training programs have demonstrated improved function and reduced injury risk in human athletes. Examples:

- balance and proprioception (body awareness) improved in female basketball players after a 6-week neuromuscular training program (McLeod et al, *J Sport Rehab* 2009)
- young female soccer players that underwent a sports-specific training intervention before workouts had an 88% decrease in anterior cruciate ligament injury vs. controls over 2-year follow-up (Mandelbaum et al, *American Journal of Sports Medicine* 2005)
- volleyball players with history of ankle sprains demonstrated a significant reduction in reocurrence if they underwent a prescribed balance board proprioceptive training program (Verhagen et al, *American Journal of Sports Medicine* 2004)

Conditioning for Military Working Dogs

- Fitness Assessment – Baseline and Response
  - Speed
  - Olfactory Endurance
  - Power
  - Other?
- Comprehensive program
  - Includes specificity and overload principles
  - Cross-training: speed, endurance, strength, stability, flexibility
  - Multiple planes of motion
  - Warm-up and Cool-down
- 3-5 days per week cardiovascular training
- 3 days per week strengthening and neuromuscular components

Conditioning Case Study: MWD Füles

- MWD Fitness Assessment – at 0 and 9 weeks

Functional Category	Question	Score	Notes
Speed	In now many seconds does the MWD cover a distance of 25 meters to retrieve a Kong?	_____ seconds _____ seconds _____ seconds _____ Mean	Only measure the run out to the Kong since the dog will be probably displaying maximum effort. Best done with two people so can control distance (e.g. dog runs after second person when released and second person drops kong at his feet as he's at a fixed, measurable distance from the person releasing the dog).
Olfactory Endurance	How many minutes of detection can an MWD perform (room search) without the first signs of reduced olfactory performance (e.g. disinterest in the problem, going through the motions without active sniffing, missing signals or leads	_____ minutes	Should this be more something that's looked at on a training log? Go for minutes up to a max (e.g. greater than 30? 45? depending on the season) or go for number of times the dog exhibits disinterest in a given timed problem e.g. 30 min. Former might be easier to track.

Conditioning Case Study: MWD Füles

- MWD Fitness Assessment – at 0 and 9 weeks

Physiological Parameters			
Heart Rate	Resting Heart Rate (Immediately Before Work)	_____ beats/min	
	Heart rate after 15 min detection problem (room search)	_____ beats/min	
	Heart rate after 5 min centerline drills at top speed	_____ beats/min	
	Heart rate at end of 5 minutes cooldown	_____ beats/min	
	Time after cessation of exercise that heart rate returns to pre-work level (also note the rate)	_____ bpm _____ time	
Rectal Temperature	Rectal Temperature Immediately Before Work	_____ degrees F	
	Rectal Temperature after 15 min detection problem (room search)	_____ degrees F	
	Rectal Temperature after 5 min centerline drills at top speed	_____ degrees F	
	Rectal Temperature at end of 5 minutes cooldown	_____ degrees F	
	Time after cessation of exercise that rectal temperature returns to pre-work level (also note the temperature)	_____ F _____time	
Respiratory Effort	Respiratory Effort Score Immediately Before Work		Respiratory Effort Score:
	Respiratory Effort Score after 15 min detection problem (room search)		0 = not panting, normal breathing rate under 50 per minute
	Respiratory Effort Score after 5 min centerline drills at top speed		1 = panting, tongue minimally protruding from the mouth, breaths are shallow
	Respiratory Effort Score at end of 5 minutes cooldown		2 = panting with tongue well out of mouth but not at full length, not "spade-shaped" at the end, moderate chest excursions
	Time after cessation of exercise that respiratory effort returns to zero	_____ time	3 = panting with tongue fully extended, "spade-shaped" and large chest excursions, some abdominal movement - intense effort

Conditioning Program: MWD Füles

9 weeks, 3 days per week, 3 levels of progression

Date	Exercise Name	Exercise Description	Execution - Reps, Sets, Time
Week 1 Day 1	30 minutes cardio	walk/trot intervals on treadmill or free play in fenced yard; needs to be continuous or with brief 1-2 minute breaks	2-minute slow, 1-2 minute fast interval time, 5 min warm-up at 80%, 5 min cool-down at 60%
Week 1 Day 1	10 minutes forelimb strengthening	forelimb strengthening: stand to down and/or sit to down while facing down the ramp on the grooming table or A-frame, up ramp and jump down off grooming table, running through tires, "pushups" on an unstable object, reach up and tag a target with forefeet, stepping off and onto sides of a step or other raised object	2 sets of 8-10 reps of activities involving motion; 2 sets of 2-3 minutes each for static activities
Week 1 Day 2	30 minutes cardio	walk/trot intervals on treadmill or free play in fenced yard; needs to be continuous or with brief 1-2 minute breaks	2-minute slow, 1-2 minute fast interval time, 5 min warm-up at 80%, 5 min cool-down at 60%
Week 1 Day 2	10 minutes full-body strengthening	Plyometric crawl-jumps, tire/obstacle navigation, harness pull and stairs	5 up to 8-10 reps (2 sets) depending on the exercise
Week 1 Day 2	10 minutes balance and neuromuscular training	over-under (under ramp and over grooming table), planks, dog walk, teeter-totter, tunnel crawl	2 sets of 8-10 reps of activities involving motion; 2 sets of 2-3 minutes each for static activities
Week 1 Day 3	30 minutes cardio	walk/trot intervals on treadmill or free play in fenced yard; needs to be continuous or with brief 1-2 minute breaks	2-minute slow, 1-2 minute fast interval time, 5 min warm-up at 80%, 5 min cool-down at 60%
Week 1 Day 3	10 minutes hindlimb strengthening	hindlimb strengthening: Sit-to-stand while facing uphill on a-frame or grooming table ramp, power jump-ups onto grooming table from sit position, running through tires, tug of war, dancing forward and backwards	2 sets of 8-10 reps of activities involving motion; 2 sets of 2-3 minutes each for static activities
Week 1 Day 3	10 minutes balance and neuromuscular training	over-under (under ramp and over grooming table), planks, dog walk, teeter-totter, tunnel crawl	2 sets of 8-10 reps of activities involving motion; 2 sets of 2-3 minutes each for static activities

Conditioning Program: MWD Füles

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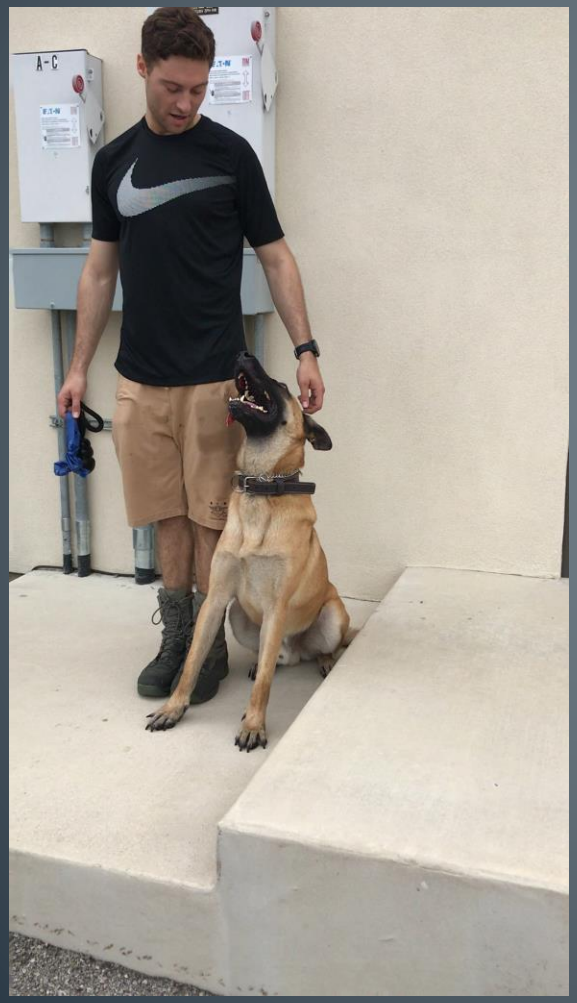
Conditioning Case Study: Results



- Subjectively, the MWD's handler reported a substantial increase in performance, particularly detection time and balance, after conditioning. The improvements were observed by the handler's colleagues and raised some interest in conducting conditioning programs with their dogs as well.

Conditioning Case Study: Results

Parameter	T = 0	T = 9 weeks	Difference
Average 25m Sprint Speed	5.14 sec	4.45 sec	-0.69sec
Time to First Signs Loss of Interest in Olfaction	13.91 min	26.12 min	+12.21 min
Resting HR	104	124	+20 bpm
Max HR with Exercise	156	140	-16bpm
Time for HR to reach baseline	55:00	5:00	-50:00
Max Temp with Exercise	107.4°F	106.0°F	-1.4°F
Time for Temp to Reach Baseline	45:00	20:00	-25:00
Max Respiratory Effort Score with Exercise	3	3	0
Time for RES to Reach Baseline	50:00	20:00	-30:00

Conditioning Case Study: Discussion

- This pilot study was conducted to assess the feasibility and effectiveness of a physical fitness assessment for MWDs, and to assess the performance and physiological responses of MWDs to a progressive conditioning program.
- Although only one dog was evaluated, the fitness test appeared to identify physiologic and performance parameters that responded to conditioning (some measures need to be more objective), and the fitness program appeared to elicit similar positive changes in physiologic and performance parameters to those developed in human athletes.
- Future assessment with more working dogs is needed to evaluate repeatability and refine the program for maximal efficacy.
- Identification of an accurate physical fitness assessment and effective conditioning program for MWDs may significantly improve their performance and reduce risk of musculoskeletal injury.

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Any Questions?