

# Training Considerations for 400m

**Shantel Twiggs**

Director of Track & Field/Cross Country

University of Nevada

NEVADA

# Shantel Twiggs

Director of Track & Field/Cross Country

University of Nevada 2004-present Head Coach

Northern Illinois University 2000-2004 Head Coach

University of Northern Iowa 1997-2000 under Chris Bucknam

Coach 2 season at Berkeley Senior Highschool under Rod Staggs

Competed for University of Northern Iowa 1990-1995

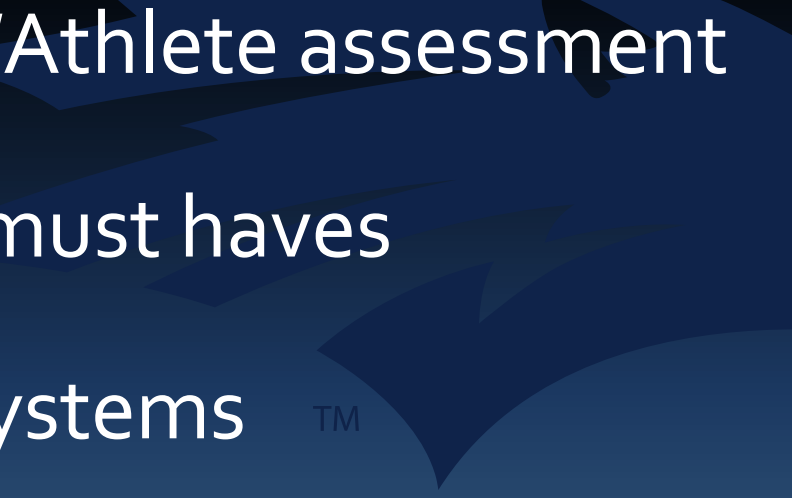
2x All American – 55m, 200m

NEVADA

# My Influences – thank you

- Leann Shaddox
- Terri Soldan
- Coach Harris
- Rod Staggs
- Chris Bucknam
- William Lawson
- Joey Woody
- Doug Case
- Ronneye Harrison
- Boo Schexnayder
- Beverly Kearney
- Caryl Smith Gilbert
- Kebba Tolbert
- Sandra Williamson
- Kirk Elias
- Scott Williamson
- Cody Fleming
- Dennis Shaver
- Vince Anderson
- Charles
- USATF
- Track & Field Academy
- Ronald Harrison
- Dana Boone
- Curtis Taylor
- Elisha Brewer
- Yvonne Wade
- Tommy Badon
- Sheila Burrell
- Shawn Jackson
- Clyde Hart
- Boo Schynader
- Every athlete I have had the opportunity to coach
- Vince Anderson
- Bill Lawson
- John Coughlan
- Doug Case
- Lonnie Green

# Overview

- Program/Athlete assessment
  - Training must haves
  - Energy Systems <sup>TM</sup>
  - Hurdle Technical Development
- 

# Program & Athlete Assessment

- Bio Motor abilities: Speed, Strength, Skill, Endurance, Flexibility Should be addressed at all times.
- Testing: 30m, standing long jump, standing triple jumps, over head back, between legs forward, single leg hoping.
- What do these test tell you?
- Athletes strengths & Weakness?
- Are they flexible?
- Do they have a 200m PR?
- How do they handle being under training stress?
- Are they afraid?
- Previous event experience?

# Training must haves:

- A plan
- Progression
- Diversity
- Understanding of Energy systems:
  - Accel-Speed-Speed Endurance- Special Endurance 1-  
Special Endurance 11-Intensive tempo-extensive  
tempo

# Bio motor Abilities

- Strength: Strength is the ability to produce large amounts of force.
- Speed: Speed is the ability to move the body and/or its parts rapidly.
- Flexibility: Flexibility is the ability to display high amplitudes of movement.
- Coordination: Coordination is the ability to perform motor skills with precision.
- Endurance: Endurance is the ability to perform large workloads and resist fatigue.

Balance approach in development of these physical performance components is essential to long term progress. These abilities are requisite to each other and are dependent upon each other. While specialization is necessary at times, the value of balanced development of these components in the program should not be underestimated.

# Understanding the Energy systems

- Acceleration development
    - 10-40m from
      - Standing start, falling start, crouch start, rolling start, pretend block, block
  - Speed
    - Max velocity -
    - 30-60m with
    - Flys 20-60m fly zone with 10m, 20m, 30m, acceleration zone
    - Ins and outs/sprint-float-sprint
  - Speed Endurance
  - Special Endurance
  - Intensive tempo
    - Borders on speed endurance and special endurance is anaerobic/aerobic system. Lactate levels are high. Quantity and control pace at 80-90%+ intensity 6-12 reps up to 600m
  - Extensive tempo
    - 60-80% intensity of aerobic capacity, 6-30 reps 100-400m in distance
- 

# Energy Systems

Table 11.9. Energy System Training for Sprinters

Training Type	Energy* System	Component (Objective)	Distance	% of Best	Recovery Time Reps.	Sets
Speed	AN	Speed [S]	20-80m	90-95%	3-5m	6-8m
	AL	Anaerobic Power	20-80m	95-100%	3-5m	6-8m
Speed Endurance	AN	Alactic Short Speed Endurance [ASSE]	50-80m	90-95%	1-2m	5-7m
	AL	Anaerobic Power	50-80m	95-100%	2-3m	7-10m
	AN	Glycolytic Short Speed Endurance [GSSE]				
		Anaerobic Capacity	Under 80m	90-95%	1m	3-4m
	GL	Anaerobic Power	Under 80m	95-100%	1m	4m
	AN	Speed Endurance [SE]	80-150m	90-95%	5-6m	
Extensive Tempo	GL	Anaerobic Power	80-150m	95-100%	6-10m	
	AR	Aerobic Capacity [AC]	Over 200m	Under 70%	Under 45s.	Under 2m.
	AR	Aerobic Power [AP]	Over 100m	70-79%	30-90s	2-3m.
Intensive Tempo	MIX	Anaerobic Capacity [ANC]	Over 80m	80-90%	30s-5m	3-10m.
Special Endurance	AN	Long Speed Endurance [LSE]	150-300m	90-95%	10-12m	
	GL	Anaerobic Power	150-300m	95-100%	12-15m	
	LAT	Lactate Tolerance [LAT]	300-600m	95-100%	Full	

\*AL: Alactic; AN: Anaerobic; AR: Aerobic; GL: Glycolytic; LAT: Lactic Acid Tolerance; MIX: Mixed anaerobic and aerobic

\*\*s: seconds; m: minutes.



# Energy Systems

*USATF Coaching Education Program - Level 2 Sprints/Hurdles/Relays 74*

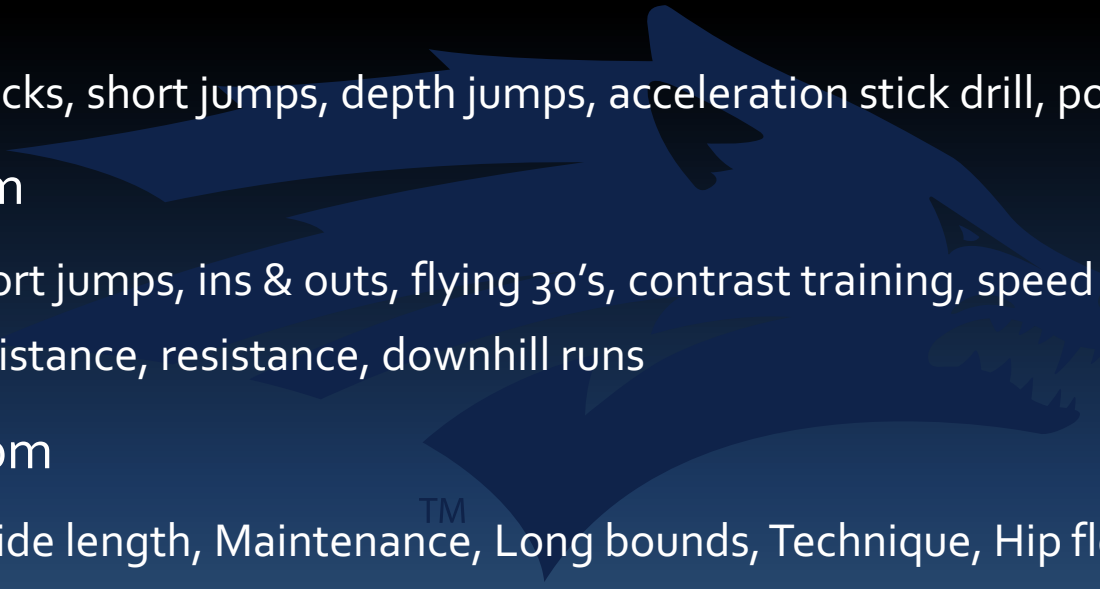
Speed Endurance	<80m	[GSSE]									
		Anaerobic Capacity	ANAEROBIC	90-95%	1' / 3-4'	300	800	300	800	600	1200
		Anaerobic Power	GLYCOLYTIC	95-100%	1' / 4'	300	800	300	800	600	1200
		Lactacid Capacity									
	80-150m	<b>Speed Endurance [SE]</b>	ANAEROBIC	90-95%	5-6'	300	900	600	1200	400	1000
		Anaerobic Power	GLYCOLYTIC	95-100%	6-10'	300	600	300	600	400	800
		Lactacid Strength									
Special Endurance I	150-300m	<b>Long Speed End. [LSE]</b>	ANAEROBIC	90-95%	10-12'	600	900	600	1200	600	1200
		Anaerobic Power	GLYCOLYTIC	95-100%	12-15'	300	900	300	1000	300	1000
Special Endurance II	300-600m	<b>Lactacid Power [LAP]</b>	LACTIC ACID	90-95%	15-20'	600	900	600	1200	900	1200
		Lactic Acid Tolerance	TOLERANCE	95-100%	FULL	300	600	300	600	300	900

***Speed vs Endurance***

# Add'l Terminology/Definitions

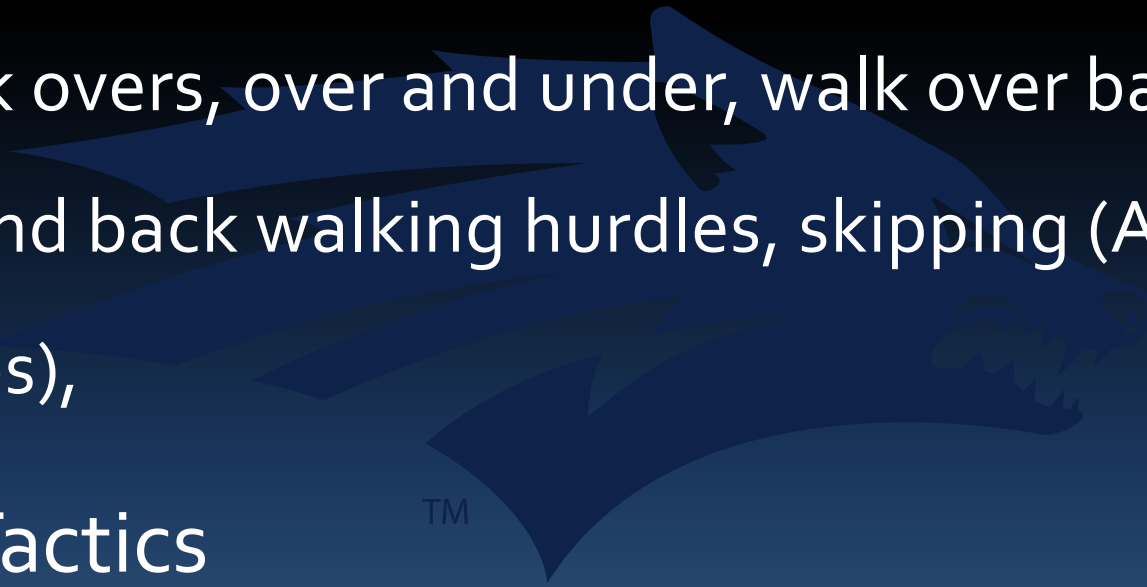
- Accelerative Power - Distance of 0 – 40m, volume 200-400m; 1 1 to 2min rest
  - Resisted runs – harness, hill sprints, sled pulls distance of 20-60m, volume 300-500m; 1-2min rest
- Absolute Speed – Distance between 30 – 80m, volume 300-500m; 3 to 4min rest
  - Variable speed runs –alternating periods of relaxed running and max velocity runs; 2-3 max velocity runs contained within one effort; 80-120m long, ex ins and outs; sprint/float/sprint type runs. 4-5min rest
  - Overspeed – 50-70m; volume 300 to 500m
- Speed Endurance – Distance between 80m to 300m; volume 500-800m; 5-8min
- Working Capacity –
  - Extensive Tempo – 100-200m @ 70-80% intensity, volume 1000-1200m; 2-3min rest
  - Intensive Tempo – 100-300m @ 80-90% intensity, volume 1000-1200m; 3-4min rest

# Training Tibbits

- 0-30m
    - Blocks, short jumps, depth jumps, acceleration stick drill, power snatch,
  - 30-60m
    - Short jumps, ins & outs, flying 30's, contrast training, speed bounds, assistance, resistance, downhill runs
  - 60-100m
    - Stride length, Maintenance, Long bounds, Technique, Hip flexor, Hip extensor, Low step ups
- 

# Technique Development

- Hurdle Mobility/Flexibility
  - Walk overs, over and under, walk over backwards, up and back walking hurdles, skipping (A, B, C series),
- Race Tactics
- Block clearance/use of free speed



# Distribution Calculation

Distribution Calculations using the 400 Meter Performance. For an athlete whose best race distance is 400 meters, divide the runner's personal best in half. Subtract 1 second from this number to attain the split time for the first 200 meters. Then, add 1 second to the same number to attain the second 200 split time. This creates a two second differential between splits. Highly trained runners of this type may have even smaller differentials. For example, for a 400 meter runner with a best of 48.6:

$$48.6 / 2 = 24.3$$

$$24.3 - 1.0 = 23.3 \text{ (first 200 meter split)}$$

$$24.3 + 1.0 = 25.3 \text{ (second 200 meter split)}$$

# Distribution Calculation

- Distribution Calculations using the 200 Meter Performance. For an athlete
- whose best race distance is 200 meters, add 0.9 seconds to the runner's
- personal best to attain the split time for the first 200 meters. Then, add 2.5
- seconds to the first 200 meter split time to attain the second 200 split time. The
- split times can be added to project the 400 meter time. For example, for a 200
- meter runner with a best of 22.6:
- $22.6 + 0.9 = 23.5$  (first 200 meter split)
- $23.5 + 2.5 = 26.0$  (second 200 meter split)
- $23.5 + 26.0 = 49.5$  (projected 400 meter time)

# Training Intensity Calculation

- **Measuring Intensity.** In many training discussions, intensity is expressed as a percentage of an athlete's maximal power output. This causes difficulty in quantification of intensity, since using the term in this way implies that no athlete running beyond maximal velocity maintenance limits (approximately 70 meters) would be capable of running at 100% intensity. However, if we interpret intensity as a percentage of one's best performance at a given race distance, we then have an easily quantifiable system and useful information. For example, if the best performance of a 400 meter runner is 48.5 seconds and we wish to determine 90 percent intensity:
  - **$(48.50 \times 100) / 90 = 53.88$**

# Race/Training Tactics

The Acceleration Phase. The 400 meter sprinter should use a maximal acceleration in the first 60 meters of the race, in order to make maximal use of intramuscular ATP stores. This acceleration phase also allows development of adequate impulse and momentum values prior to the achievement of maximal velocity.

Varying Intensity. The 400 meter sprinter should employ a race plan that varies the intensity of effort, in order to promote relaxation and delay the onset of metabolic fatigue. Common race constructs involve phases of building and maintenance, maximal and relaxed sprinting. A phase of relaxed sprinting at the completion of an extended acceleration phase, followed by a building finishing kick from some predetermined point is a common, basic plan

# Race/Training Tactics

- **Mechanics and Efficiency.** Maintenance of good mechanics is of great assistance when battling fatigue in the 400 meters. Maintenance of good posture allows continued elastic energy generation and heightens efficiency. Maintaining or even increasing amplitudes of movement under the stress of fatigue enables maximal displacement per unit of energy expenditure

# Pace/Predictions Cheat sheet

USATF Coaching Education Program - Level 2 Sprints/Hurdles/Relays 117

400m Time	1 <sup>st</sup> 200m	2 <sup>nd</sup> 200m	Differential 1 <sup>st</sup> 200m-2 <sup>nd</sup> 200m	Projected 200m Best	Differential 1 <sup>st</sup> 200m-200m Best	300m Split	Projected 100m Best	% of 100m best for each section:			
								93 100m	97 100m	88 100m	85 100m
44.00	21.00	23.00	2.00	19.95	1.05	32.27	9.96	10.71	10.29	11.27	11.73
44.40	21.20	23.20	2.00	20.14	1.06	32.57	10.06	10.81	10.39	11.37	11.83
44.80	21.40	23.40	2.00	20.33	1.07	32.87	10.15	10.91	10.49	11.47	11.93
45.20	21.60	23.60	2.00	20.52	1.08	33.16	10.24	11.02	10.58	11.56	12.04
45.60	21.80	23.80	2.00	20.71	1.09	33.46	10.34	11.12	10.68	11.66	12.14
46.00	22.00	24.00	2.00	20.90	1.10	33.76	10.43	11.22	10.78	11.76	12.24
46.40	22.20	24.20	2.00	21.09	1.11	34.06	10.53	11.32	10.88	11.86	12.34
46.80	22.40	24.40	2.00	21.28	1.12	34.36	10.62	11.42	10.98	11.96	12.44
47.20	22.60	24.60	2.00	21.47	1.13	34.65	10.72	11.53	11.07	12.05	12.55
47.60	22.80	24.80	2.00	21.66	1.14	34.95	10.81	11.63	11.17	12.15	12.65
48.00	23.00	25.00	2.00	21.85	1.15	35.25	10.91	11.73	11.27	12.25	12.75
48.40	23.20	25.20	2.00	22.04	1.16	35.55	11.00	11.83	11.37	12.35	12.85
48.80	23.40	25.40	2.00	22.23	1.17	35.85	11.10	11.93	11.47	12.45	12.95
49.20	23.60	25.60	2.00	22.42	1.18	36.14	11.19	12.04	11.56	12.54	13.06
49.60	23.80	25.80	2.00	22.61	1.19	36.44	11.29	12.14	11.66	12.64	13.16
50.00	24.00	26.00	2.00	22.80	1.20	36.74	11.38	12.24	11.76	12.74	13.26
50.40	24.20	26.20	2.00	22.99	1.21	37.04	11.48	12.34	11.86	12.84	13.36
50.80	24.40	26.40	2.00	23.18	1.22	37.34	11.57	12.44	11.96	12.94	13.46
51.20	24.60	26.60	2.00	23.37	1.23	37.63	11.67	12.55	12.05	13.03	13.57
51.60	24.80	26.80	2.00	23.56	1.24	37.93	11.76	12.65	12.15	13.13	13.67
52.00	25.00	27.00	2.00	23.75	1.25	38.23	11.86	12.75	12.25	13.23	13.77
52.40	25.20	27.20	2.00	23.94	1.26	38.53	11.95	12.85	12.35	13.33	13.87
52.80	25.40	27.40	2.00	24.13	1.27	38.83	12.05	12.95	12.45	13.43	13.97
53.20	25.60	27.60	2.00	24.32	1.28	39.12	12.14	13.06	12.54	13.52	14.08
53.60	25.80	27.80	2.00	24.51	1.29	39.42	12.24	13.16	12.64	13.62	14.18
54.00	26.00	28.00	2.00	24.70	1.30	39.72	12.33	13.26	12.74	13.72	14.28
54.40	26.20	28.20	2.00	24.89	1.31	40.02	12.43	13.36	12.84	13.82	14.38
54.80	26.40	28.40	2.00	25.08	1.32	40.32	12.52	13.46	12.94	13.92	14.48
55.20	26.60	28.60	2.00	25.27	1.33	40.61	12.62	13.57	13.03	14.01	14.59
55.60	26.80	28.80	2.00	25.46	1.34	40.91	12.71	13.67	13.13	14.11	14.69
56.00	27.00	29.00	2.00	25.65	1.35	41.21	12.81	13.77	13.23	14.21	14.79
56.40	27.20	29.20	2.00	25.84	1.36	41.51	12.90	13.87	13.33	14.31	14.89
56.80	27.40	29.40	2.00	26.03	1.37	41.81	13.00	13.97	13.43	14.41	14.99
57.20	27.60	29.60	2.00	26.22	1.38	42.10	13.09	14.08	13.52	14.50	15.10
57.60	27.80	29.80	2.00	26.41	1.39	42.40	13.19	14.18	13.62	14.60	15.20

95 80

# Weight lifting

- Olympic lifts – 4-8 sets of 1 to 6 repetitions, recoveries should be long enough to guarantee the quality of work
- Static lifts – 4-8 sets of 4-8 repetitions, recoveries should be long enough to guarantee the quality of work
- Ballistic lift – 5-12 repetitions
- Body building lifts – 20-24 total sets of 10-12 repetitions with 1min to 90sec recovery

# Olympic lifts



# Static Lifts



# Body Building



# Multi Throws

- Multi throws – High intensity exercises, performed from various positions, using shot, heavy medicine ball as a load. May use jumps in combination with throw to intensify the loading phase of the exercise.
  - Develop power and coordination
  - Loads of 15-40 per session
  - OHS, BLF, lunge overhead throw, hop, hop, blf

# Multi-throws



# Med Ball – General Strength

- Medicine Ball Exercises – catch/throw combination exercises, abdominal and spinal exercises with med ball and callisthenic type exercises using a ball as a light load.
  - Improves coordination, body control, muscular strength, and strength endurance
  - Can be strength training or recovery
  - Variety of exercises 8-15min in duration 1-3 sets
  - Focus on stability during the catch – target should be reasonably outside the frame of the body to increase the postural demand

# Med Ball Throws



# Circuit Training

Circuit Training for Fitness and Recovery Design Guidelines				
	General Strength	Medicine Ball	In Place Jumps	Bodybuilding
Exercises	10-16	10-16	8-16	8-12
Total Sets	10-16	10-16	10-16	20-24
Work Interval	15-30 sec	20-40 sec.	12-20 sec.	10-12 reps.
Recovery Time	1/2 to 2x Work Interval	1/2 to 1x Work Interval	1-2x Work Interval	60-90 secs.
Total Circuit Time	8-12 min.	8-12 min.	10-16 min.	24-36 min.

# General ideas to build Strength/Power

General Strength exercises:	Body building:	Depth jumps:
Finger tip push ups Prisoner squats Side to side in place lunges Back and forward lunge in place Vups Superman Single leg body bridge Leg raise body bridge Squat lunge walks on ball foot B/F Side body bridge leg raise Seated leg raise extend Ball foot squats Lunge walks on ball of the foot	Behind head press Behind head pull down Hamstring curl Lunges with weight on back Side twist step up with dumbbells Plate twists stationary Lunge plate twist Weighted Hanging alternating diagonal leg swings Weighted plated toe touch twists Weighted sit up knees in air	From box to ground to sand From box to ground over hurdle to sand Box to ground to box to ground to sand Box to ground to box to ground to hurdle to sand Sideways box to ground to box to sand Single leg hops off box to ground to box to sand (short box) In place jumps

# Multi Jumps

- develop reactive strength and elastic response.
- Enhance force application to the ground are considered.
  - Short bounds - 1-5 takeoffs 30-70 per session
  - In place jumps- 8-20 contacts, 150-300 contacts per session (improves work capacity for jump training)
  - Extended bounds – jumps over significant distance. 20-40m volume not to exceed 400m
  - Depth jumps – 20-50 contacts per session
- Full footed contacts with a rolling contact of the foot
- Good posture

# Multi-jumps - In place jumps



# Multi-Jumps -Depth Jumps



# Multi-jumps - Short Jumps

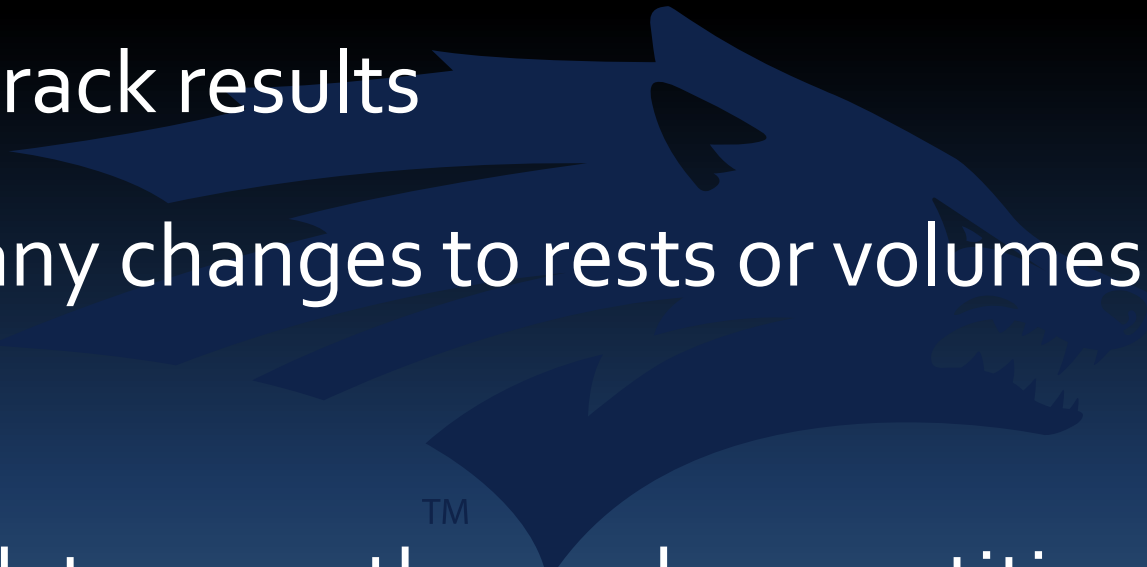


# Multi-jumps - Extended Bounds



# Collecting Data

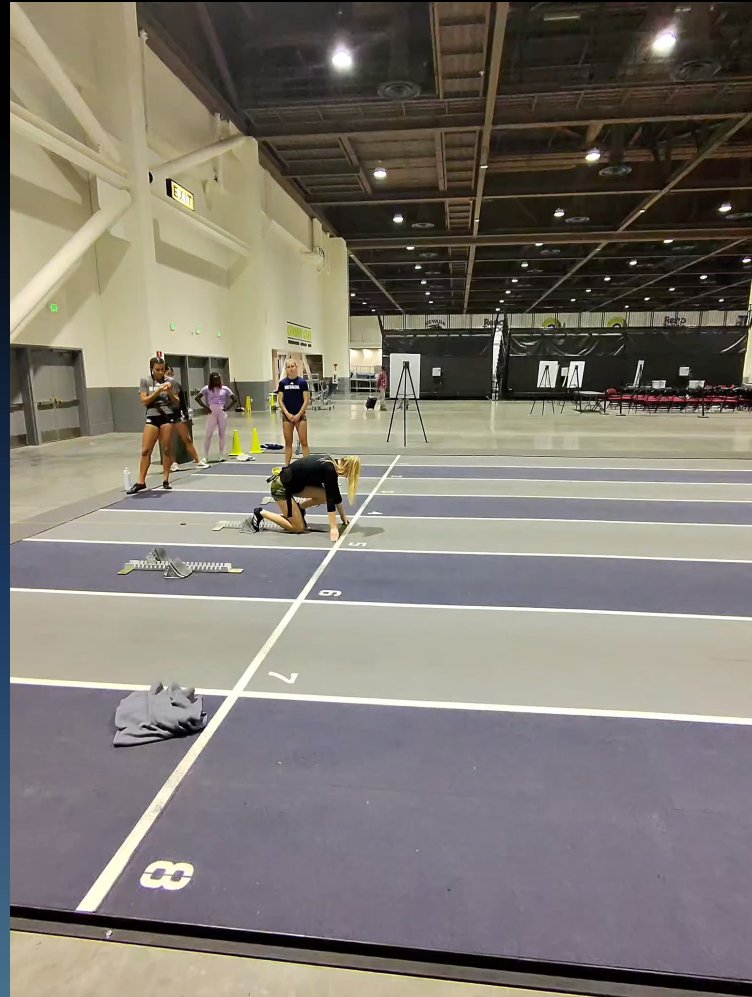
- Write down your training plan
- Keep track results
- Note any changes to rests or volumes and why
- Note dates, weather and competition performance results



# Acceleration Dev



# 1080 – Acceleration Dev



# Indoor 400m Race 12-6-25



# Mt. Sac Relays – 400m 4-18-25



# LSU Alumni Gold – 400m 4/26/25



# Results from LSU Alumni Gold



# Training Consideration for the 400m

- Any Questions???
- Thank you for your time!
- If you would like to reach me:
- Shantel Twiggs, [stwiggs@unr.edu](mailto:stwiggs@unr.edu)