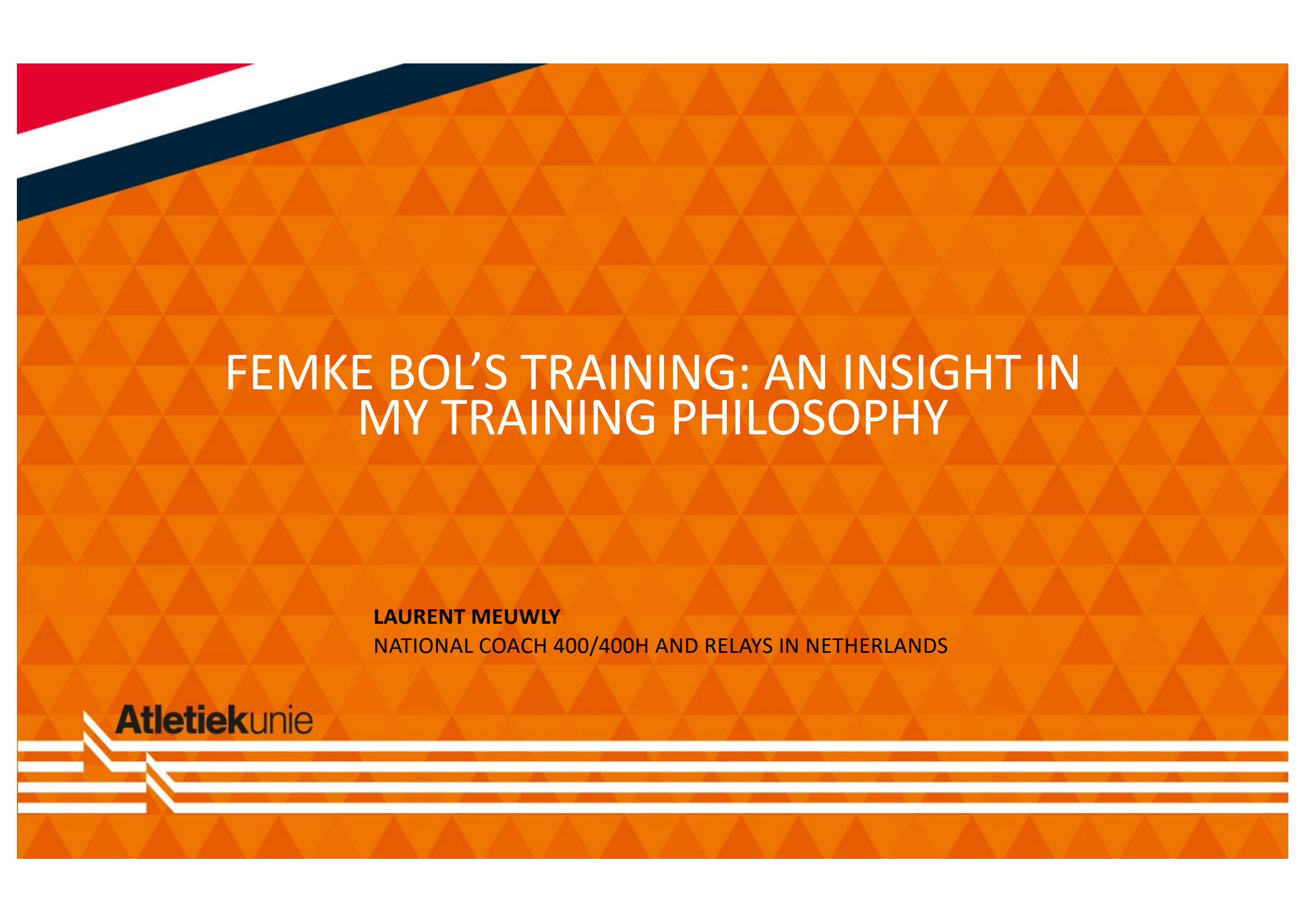




FEMKE BOL'S TRAINING: AN INSIGHT IN MY TRAINING PHILOSOPHY

LAURENT MEUWLY

NATIONAL COACH 400/400H AND RELAYS IN NETHERLANDS



Atletiekunie

FEMKE BOL



FEMKE BOL

- ✓ **WORLD CHAMPION IN 2023 AND INDOOR IN 2024**
- ✓ **WORLD SILVER IN 2022**
- ✓ **OLYMPIC BRONZE IN 2021 AND 2024**
- ✓ **EUROPEAN CHAMPION 5X in individual**
- ✓ **DL WINS: 24x (4x DL FINAL WINNER)**
- ✓ **EUROPEAN U20 CHAMPION 2019**
- **PBs: 400M 49.44 (49.17i WR) / 400M HURDLES 50.95 / 200M 22.64i**
- **4x400: OLYMPIC CHAMPION AND WORLD CHAMPION**

LIEKE KLAVER



LIEKE KLAVER

- ✓ **WORLD 4TH IN 2022**
 - ✓ **WORLD 6TH IN 2023**
 - ✓ **WORLD INDOOR SILVER IN 2024**
 - ✓ **EUROPEAN INDOOR SILVER IN 2023**
 - ✓ **DL WIN: 1X**
 - ✓ **4X400: OLYMPIC CHAMPION, WORLD CHAMPION**
- **PBs: 400M 49.58 (50.10i) / 200M 22.46**

LEA SPRUNGER



LEA SPRUNGER

- ✓ EUROPEAN CHAMPION 2018 400M HURDLES
- ✓ EUROPEAN INDOOR CHAMPION 2019 400M
- ✓ WORLD 4TH IN 2019
- ✓ WORLD 5TH IN 2017
- ✓ WORLD INDOOR TOUR 2018 400M WINNER
- ✓ DL WINS: 3X

➤ PBs: 400M 50.52 (51.28i) / 400M H 54.04 / 200M 22.38 (22.88i)

TRAINING PHILOSOPHY



TRAINING PHILOSOPHY

FROM GENERAL TO SPECIFIC (THE IMPORTANCE TO BE VERSATILE)

TRAINING PHILOSOPHY

BE A FANATIC IN THE GYM

TRAINING PHILOSOPHY

ENDURANCE SHOULD BE YOUR BEST ENEMY

TRAINING PHILOSOPHY

PRACTICE YOUR SPEED ALL OVER THE YEAR

TRAINING PHILOSOPHY

SHORT TO LONG

OR

LONG TO SHORT

TRAINING PHILOSOPHY

FROM SHORT AND LONG TO... SPECIFIC

TRAINING PHILOSOPHY

POLARIZED TRAINING

TRAINING PHILOSOPHY



SHORT > LONG / LONG > SHORT

SHORT > LONG

- Speed reserve
- Rhythm + Speed
- Acceleration work
- High volume of strength, plyometrics and speed

-> Watch out the running economy!

SHORT > LONG / LONG > SHORT

LONG > SHORT

- 30-40% aerobic trainings
- A lot of highly specific (lactic) work (ca. 2x more)
@80-85%

-> You need genetically talented athletes (for sprint)

SHORT > LONG / LONG > SHORT / POLARIZED TRAINING

- During the career
- During the season
- **WORK @ 90% AND ABOVE AND 70% AND BELOW**

**SPEED OF A SPRINTER AND ENDURANCE OF
AN 800M RUNNER**

SHORT > LONG / LONG > SHORT

**MAXIMIZE YOUR STRENGTHS AND MINIMIZE
YOUR WEAKNESSES**

FLYERS VS DIESELS

SPEED ORIENTED ATHLETES

VS

ENDURANCE BASED ATHLETES

FLYERS VS DIESELS

- 2 or 3 profiles? Neutrals?
- How do we classify them? Objective vs Subjective criterias
- How good must the strength points be?
- How bad can the weakness points be?
- Influence on training
- Influence on recovery
- Influence on race plan
- 400, 400H or 800m depending the profile?

RACE PLANS

IDEAL PROFILE	TARGET	100	200	300	400	0-200	200-400	1.200/2. 200
FLYER WOMAN	51,00	12,25	24,00	36,75	51,00	24,00	27,00	3,00
IDEAL PROFILE	TARGET	100	200	300	400	0-200	200-400	1.200/2. 200
DIESEL WOMAN	51,00	12,50	24,50	37,25	51,00	24,50	26,50	2,00

PROFILES

ATHLETE	400M	400MH	200M	100M
LEA SPRUNGER	50.52	54.04	22.38	11.34
LIEKE KLAVER	49.58		22.46	11.33
FEMKE BOL	49.17i	50.95	22.64i	11.47

PROFILES

ATHLETE	START 0-30M	FLYING 30M	CLEANS	VO2MAX	WINGATE PEAK POWER	WINGATE MEAN POWER
LEA SPRUNGER	4.28	2.98	90	49	20.8 W/KG	10.9 W/KG
LIEKE KLAVER	4.36	2.93	110	51	21.9 W/KG	11.8 W/KG
FEMKE BOL	4.53	3.01	100	56	19.5 W/KG	10.9 W/KG

PROFILES

ATHLETE	WINGATE FATIGUE INDEX	SHOT PUT FRONT (3kg)	SHOT PUT BACK (3kg)	STANDING LJ	CMJ (no arms)	CMJ REPEATED 30"
LEA SPRUNGER	40.1 W/KG	19.95	18.90	2.93	52.4 CM	AVG 36.5 CM / RSI 2.77
LIEKE KLAVER	31.2 W/KG	18.05	19.75	2.62	47.7 CM	AVG 30.0 CM / RSI 3.01
FEMKE BOL	23.0 W/KG	18.80	20.23	2.92	54.5 CM	AVG 36.0 CM / RSI 3.31

PROFILES

ATHLETE	STRIDE LENGTH	STRIDE FREQUENCY	GROUND CONTACTS
LEA SPRUNGER	2.34	4.30	0.098
LIEKE KLAVER	2.26	4.62	0.092
FEMKE BOL	2.28	4.48	0.106

CRITERIA (KPIs)

SPEED BASED (FLYERS):

- ✓ MAX V
- ✓ ACCELERATION
- ✓ MAX STRENGTH
- ✓ PEAK POWER
- ✓ GROUND CONTACT TIMES
- ✓ STRIDE FREQUENCY
- ✓ REACTIVE JUMPS
- ✓ ANAEROBIC POWER

ENDURANCE BASED (DIESELS):

- ✓ $\dot{V}O_{2\max}$ (AEROBIC POWER)
- ✓ MEAN POWER
- ✓ FATIGUE INDEX
- ✓ CRUISE EFFICIENCY
- ✓ ANAEROBIC CAPACITY
- ✓ STRENGTH ENDURANCE
- ✓ TECHNIQUE UNDER FATIGUE

CRITERIA

	MAX STRENGTH	POWER	MAX SPEED	JUMPS (CM)/RSI/SLJ	ACCELERATION	GROUND CONTACT TIMES	STRIDE FREQUENCY	ANAEROBIC POWER		ENDURANCE	ANAEROB CAPACITY	MEAN POWER	FATIGUE INDEX	CRUISING EFFICIENCY	STRENGTH ENDURANCE	TECHNIQUE FATIGUE
FLYERS																
ATHLETE A	8	8	9	9	9	7	8	8		5	5	7	8	6	7	6
ATHLETE B	5	7	7	6	6	8	7	9		8	7	5	4	6	8	5
DIESELS																
ATHLETE D	5	6	7	4	6	5	5	8		9	7	8	6	6	5	6
ATHLETE E	9	8	6	8	5	6	5	9		10	9	8	6	9	9	9

TRAINING PROGRAMS

PROFILES	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
FLYERS	SPEED: Fly ins 30+20 x2 / 30+30 x2 / 30+40 x2 / 30+50 x2	ENDURANCE: 2x (8x200) r.30'' R.4'	SPEED ENDURANCE: 3x (3x120) r.5'. R.10'	ENDURANCE: 2x (500-400-300- 200) r.1'30-1'- 45'' R.4'	ACCELERATION: Resisted bounds&sprints: <i>short, explosive, performance</i>	HILLS: 3x (40''- 30''-20'') r.3' R.10'	REST
	STRENGTH	REST	SPECIFIC STRENGTH	REST	STRENGTH	REST	REST
DIESELS	SPEED: Fly ins 30+20 x2 / 30+30 x2 / 30+40 x2 or SPEED ENDURANCE: 3x (4x60) r.2' R.8'	ENDURANCE: 12x300 r.45''	SPEED ENDURANCE: 2x (4x120) r.4'. R.8'	ENDURANCE: 6x500 r.1'30	ACCELERATION: Resisted bounds&sprints: <i>less intense, longer and more volume</i>	HILLS: 3x (40''- 30''-20'') r.3' R.10'	REST
	STRENGTH	REST	SPECIFIC STRENGTH	REST	STRENGTH	REST	REST

KEY POINTS

1. PLANIFICATION
2. GOAL(S)
3. ENVIRONMENT (WHAT DOES IT TAKE...)
4. MENTAL
5. THE CHAMPIONSHIP BUBBLE

PLANIFICATION

- REVERSE PLANNING
- HOW MANY WEEKS TO THE MAJOR CHAMPIONSHIPS?
- HOW MANY WEEKS BETWEEN 2 PEAKS OR 2 IMPORTANT COMPETITIONS?
- HOW MANY COMPETITIONS DO WE NEED TO GET READY?
- HOW MANY RECOVERY WEEKS OR BREAKS?

PLANIFICATION

- MAIN GOALS / MAJOR CHAMPIONSHIPS
- INTERMEDIATE GOALS
- INDOOR SEASON (YES OR NO)
- TRAININGS CAMPS
- INTERNATIONAL MEETINGS (DL, ranking...)

PLANIFICATION (PREPARATION 1)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
SUBMAX SPEED	ENDURANCE	SPEED ENDURANCE	ENDURANCE	HURDLES	STRENGTH ENDURANCE	REST
STRENGTH	REST	SPECIFIC STRENGTH (CIRCUIT)	REST	STRENGTH	REST	REST

PLANIFICATION (PREPARATION 2)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
MAX SPEED	ENDURANCE	SPEED ENDURANCE	ENDURANCE	STARTS / HURDLES	SPECIAL ENDURANCE	REST
STRENGTH	REST	SPECIFIC STRENGTH	REST	STRENGTH	REST	REST

PLANIFICATION (PRECOMPETITION)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
MAX SPEED OU SPEED ENDURANCE	ENDURANCE	HURDLES / LACTIC POWER	ENDURANCE	STARTS / ACCELERATION	SPECIAL ENDURANCE	REST
STRENGTH	REST	REST	REST	STRENGTH	REST	REST

PLANIFICATION (COMPETITION)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OVERSPEED OR SPEED ENDURANCE	ENDURANCE	SPECIAL ENDURANCE / LACTIC POWER / HURDLES	STRENGTH	TRAVEL	COMPETITION	REST
STRENGTH	REST	REST	REST	PRE MEET	REST	REST

PLANIFICATION (CHAMPIONSHIP)

	TUESDAY 28.02	WEDNESDAY 01.03	THURSDAY 02.03	FRIDAY 03.03	SATURDAY 04.03	SUNDAY 05.03	MONDAY 06.03
06:00							
06:30				Breakfast			
07:00							
07:30		Breakfast	Breakfast	Go to the track			
08:00							
08:30			Go to the track				
09:00		TRAINING WU AREA (Shake out - Exchanges)	OFFICIAL TRAINING PRE MEET				
09:30				Warm up	Breakfast	Breakfast	
10:00				Call room			
10:30				10:40-11:15 400 F R1	Boots	Boots	
11:00							
11:30				Cool down			
12:00			Physio	Physio	*Race talk		
12:30				Ice bath	Physio	Physio	
13:00		Lunch	Lunch	Lunch			
13:30				Boots	Lunch	Lunch	
14:00		Nap	Press conference	Nap			
14:30					Nap	Nap	
15:00		Physio					
15:30			Race talk	Race talk		Snack	
16:00		Snack	Snack	Snack	Snack		
16:30					4x400 Meeting		
17:00	ARRIVAL IN ISTANBUL				4x400 Meeting	Go to the track	
17:30				Go to the track			
18:00					Go to the track		DEPARTURE
18:30	Arrival Hotel	Team meeting?				Warm up	
19:00				Warm up		Call room	
19:30	Physio			Call room	Warm up	19:25 4x400 W F	
20:00	Dinner	Dinner	Dinner	19:55-20:10 400 W SF	Call room		
20:30				Cool down	20:30 400 W F	20:40 VC 4x400 M	
21:00				Ice bath	Cool down		
21:30				Dinner	21:15 VC 400 W	Dinner	
22:00		Sleep	Sleep	Race talk*	Ice bath		
22:30	Sleep			Physio	Dinner		
23:00				Sleep	Physio		
23:30					Sleep		
00:00							

PLANIFICATION

- PREPARATION: VERY STRICT, STAY CLOSE TO THE PLAN
- COMPETITION: VERY FLEXIBLE, RECOVERY, STAY HEALTHY

GOAL (S)

- REALISTIC BUT CHALLENGING
- WHAT DO WE COMMUNICATE? WHEN?

ENVIRONMENT

WORLDWIDE SITUATION / RACE ANALYSIS / PROFILES

RACE ANALYSIS – WHY?

- ANALYZE THE BIOMECHANICS
- ANALYZE RACE TACTICS
- HAVE EXACT SPLITS
- ANALYZE THE CONCURRENCE
- COMPARE TO THE BENCHMARK
- ANALYZE THE YEAR DEVELOPMENT
- ...

ENVIRONMENT

BENCHMARKING WORLDS OUTDOOR

	MOSCOW 13	BEIJING 15	LONDON 17	DOHA 19	EUGENE 22	BUDAPEST 23
TOP 3	54,27	54,02	53,74	53,74	53,13	52,81
TOP 8	54,96	54,86	54,33	54,52	53,72	53,89
TOP 16/24	55,96	56,47	56,54 (24)	56,37 (24)	56,09 (24)	55,29

WORLDWIDE SITUATION

400 splits (rounded up tenth)

Salwa Eid Naser 🇨🇩

12.1 - 23.2 - 35.1 - 48.14

12.1 + 11.1 + 11.9 + 13.1 (+25.0)

@Hey_ItsShaunae 🇧🇸

12.1 - 23.6 - 35.7 - 48.37

12.1 + 11.5 + 12.1 + 12.7 (+24.8)

Marita Koch 🇩🇪 WR

11.70 - 22.47 - 34.22 - 47.60

11.70 + 10.77 + 11.75 + 13.38

(+25.13)

Doha 2019 Final									
400m	100m	200m	300m	400m	100-200	200-300	300-400	2. 200m	Differenz
Gardiner Steven -4	11.04	20.96	31.58	43.48	9.92	10.62	11.90	22.52	1.56
Zambrano Anthony -8	11.00	21.18	32.10	44.15	10.18	10.92	12.05	22.97	1.79
Kerley Fred -5	10.92	20.82	31.76	44.17	9.90	10.94	12.41	23.35	2.53
Gaye Demish -3	11.08	21.16	32.48	44.46	10.08	11.32	11.98	23.30	2.14
James Kirani -7	10.78	20.76	31.76	44.54	9.98	11.00	12.78	23.78	3.02
Korir Emmanuel -9	11.18	21.16	32.22	44.94	9.98	11.06	12.72	23.78	2.62
Cedenio Machel -6	10.80	20.68	31.84	45.3	9.88	11.16	13.46	24.62	3.94
Bloomfield Akeem -2	11.16	21.34	32.66	45.36	10.18	11.32	12.70	24.02	2.68

WORLDWIDE SITUATION

Position	Final	100	200	300	400	0-100	100-200	200-300	300-400	200-400	1.200/2.200
1	Allyson Felix	11,46	23,40	35,66	49,28	11,46	11,94	12,26	13,62	25,88	2,48
2	Shaunae Miller	12,28	23,86	36,16	49,67	12,28	11,58	12,30	13,51	25,81	1,95
3	Shericka Jackson	12,16	23,42	36,10	49,99	12,16	11,26	12,68	13,89	26,57	3,15
4	Christine Day	12,62	24,40	36,62	50,14	12,62	11,78	12,22	13,52	25,74	1,34
5	Stephenie Ann McPherson	12,42	24,28	36,58	50,42	12,42	11,86	12,30	13,84	26,14	1,86
6	Novlene Williams-Mills	12,38	23,92	36,58	50,47	12,38	11,54	12,66	13,89	26,55	2,63
7	Phyllis Francis	12,32	23,94	36,66	50,51	12,32	11,62	12,72	13,85	26,57	2,63
8	Christine Ohuruogu	12,14	23,78	36,34	50,63	12,14	11,64	12,56	14,29	26,85	3,07

<i>Average</i>	<i>12,22</i>	<i>23,88</i>	<i>36,34</i>	<i>50,14</i>	<i>12,22</i>	<i>11,65</i>	<i>12,46</i>	<i>13,80</i>	<i>26,26</i>	<i>2,39</i>
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Filmed, analysed and delivered by:

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WORLDWIDE SITUATION

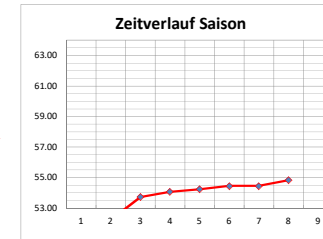
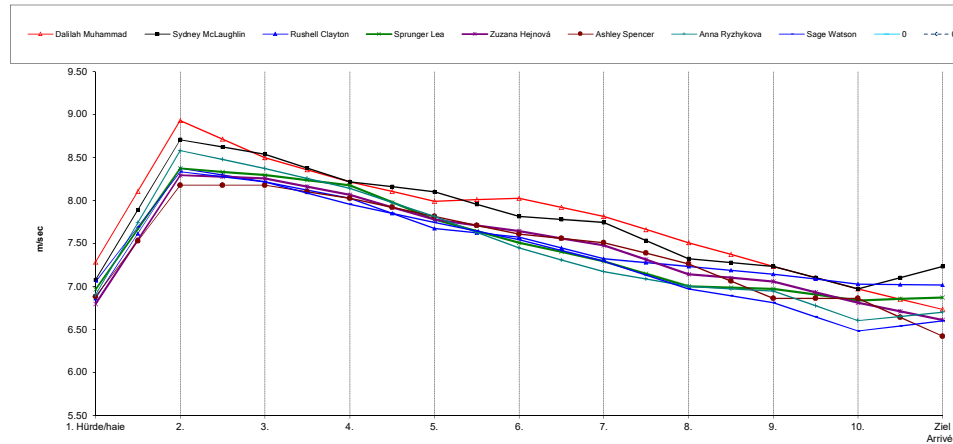
	1	2	3	4	5	6	7	8	9	10	finish		5th hurdle	Difference between the two 200m
Kori CARTER	6,39	4,08	4,04	4,16	4,44	4,44	4,64	4,92	5,00	5,16	5,80	53,07	23,11	3,30
USA	L	15			16			17						
Dalilah MUHAMMAD	6,12	3,92	4,20	4,28	4,36	4,48	4,72	5,00	5,04	5,28	6,10	53,50	22,88	4,41
USA	R	15						16						
Ristannana TRACEY	6,46	4,08	4,12	4,20	4,32	4,56	4,72	5,04	5,12	5,16	5,96	53,74	23,18	3,73
JAM	L	15				16		17						
Zuzana HEJNOVA	6,60	4,12	4,16	4,24	4,36	4,52	4,56	4,88	5,04	5,36	6,36	54,20	23,48	3,62
CZE	R	15						16		17				
Lea SPRUNGER	6,47	4,16	4,28	4,40	4,56	4,64	4,84	5,00	5,12	5,28	5,84	54,59	23,87	3,14
SUI	R	14		15										
Sage WATSON	6,39	4,16	4,12	4,28	4,44	4,56	4,68	5,12	5,28	5,60	6,29	54,92	23,39	4,49
JAM	R	15						16		17				
Cassandra TATE	6,42	4,16	4,28	4,36	4,48	4,56	4,84	5,00	5,44	5,52	6,36	55,42	23,70	4,37
USA	R	15							17					
Eilidh DOYLE	6,51	4,24	4,24	4,40	4,48	4,68	4,88	5,16	5,28	5,48	6,36	55,71	23,87	4,23
GBR	L	15				16	17		18					

WORLDWIDE SITUATION

Swiss Athletics / Analyse 400mH

Wettkampfanalyse 400m Hürden / Analyse de compétition 400m haies														Saison:	2019	Name/Nom:	WM Final Doha 2019					
Analysen	Wettkampf Compétition	1. Hürde/hale	2.	3.	4.	5.	1. 200m	6.	7.	8.	9.	10.	Ziel Arrivée	2. 200m	Diff. 200m	Rang	Bahn Piste					
Eingabe: fortlaufende Zeit Bodenfasen nach der Hürde und Schrittzahlen / Entrée: temps continue de contact après la haie et le nombres des foulées																						
Zwischenzeiten Temps interméd.	1 Dailiah Muhammad	6.18	10.10	14.22	18.48	22.86	24.60	27.22	31.70	36.36	41.20	46.22	52.16	27.56	2.95	1	6					
	2 Sydney McLaughlin	6.36	10.38	14.48	18.74	23.06	24.85	27.54	32.06	36.84	41.68	46.70	52.23	27.38	2.53	2	4					
	3 Rushell Clayton	6.56	10.74	15.00	19.36	23.92	25.77	28.54	33.32	38.16	43.06	48.04	53.74	27.97	2.20	3	5					
	4 Sprunger Lea	6.46	10.64	14.86	19.14	23.64	25.50	28.30	33.10	38.10	43.12	48.24	54.06	28.56	3.05	4	9					
	5 Zuzana Hejnová	6.62	10.84	15.08	19.42	23.92	25.75	28.50	33.18	38.08	43.04	48.18	54.23	28.48	2.73	5	8					
	6 Ashley Spencer	6.54	10.82	15.10	19.46	23.94	25.78	28.54	33.20	38.02	43.12	48.22	54.45	28.67	2.89	6	2					
	7 Anna Ryzhykova	6.52	10.60	14.78	19.08	23.56	25.44	28.26	33.14	38.14	43.18	48.48	54.45	29.01	3.57	7	3					
	8 Sage Watson	6.38	10.58	14.84	19.24	23.76	25.62	28.40	33.20	38.22	43.36	48.76	54.82	29.20	3.59	8	7					
	9 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
	10 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
Abschnittszeiten Temps partiels	1 Dailiah Muhammad	23	6.18	15	3.92	15	4.12	15	4.26	15	4.38	15	4.36	15	4.48	15	4.66	16	4.84	16	5.02	5.94
	2 Sydney McLaughlin	23	6.36	15	4.02	15	4.10	15	4.26	15	4.32	15	4.48	15	4.52	16	4.78	16	4.84	16	5.02	5.53
	3 Rushell Clayton	23	6.56	15	4.18	15	4.26	15	4.36	15	4.56	15	4.62	15	4.78	16	4.84	16	4.90	16	5.02	5.70
	4 Sprunger Lea	21	6.46	14	4.18	14	4.22	14	4.28	14	4.50	15	4.66	15	4.80	15	5.00	15	5.02	15	5.12	5.82
	5 Zuzana Hejnová	21	6.62	14	4.22	14	4.24	14	4.34	14	4.50	15	4.68	15	4.80	15	5.00	15	5.02	15	5.14	6.05
	6 Ashley Spencer	21	6.54	14	4.28	14	4.30	14	4.40	14	4.58	15	4.66	15	4.86	15	5.00	15	5.10	15	5.12	6.23
	7 Anna Ryzhykova	21	6.52	14	4.08	14	4.18	14	4.30	14	4.48	15	4.60	15	4.88	15	5.00	15	5.02	15	5.12	5.97
	8 Sage Watson	21	6.38	14	4.20	14	4.26	14	4.40	14	4.52	15	4.64	15	4.80	15	5.00	15	5.02	15	5.14	6.06
	9 0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	10 0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Schrittrhythmus		0-45m	45-80m	80-115m	115-150m	150-185m	185-220m	220-255m	255-290m	290-325m	325-360m	360-400m										

Geschwindigkeitsverlauf
Courbe de vitesse



400H-WM-Final-2019-Frauen.xls

(C) Flavio Zberg - 05.10.2019

WORLDWIDE SITUATION

	22	15	15	15	15	15	15	15	15	15		
Shamier Little	6,39	10,41	14,63	19,08	23,41	27,92	32,5	37,52	42,71	47,59	53,44	Finir de la mauvaise jambe
Droite		4,02	4,22	4,45	4,33	4,51	4,58	5,02	5,19	4,88	5,85	Départ extrêmement rapide
	22	15	15	15	15	15	15	16	16	16		
Georganne Moline	6,65	10,77	15,13	19,61	24,16	28,82	33,63	38,57	43,68	48,64	54,09	Passe 4 haies en 16
Droite		4,12	4,36	4,48	4,55	4,66	4,81	4,94	5,11	4,96	5,45	Gros finish!
	22	15	15	15	15	15	16	16	16	16		
Zuzanna Hejnova	6,57	10,74	15,08	19,41	23,87	28,52	33,18	38,16	43,28	48,45	54,5	Finir de la mauvaise jambe
Droite		4,17	4,34	4,33	4,46	4,65	4,66	4,98	5,12	5,17	6,05	Fin un peu difficile
	22	15	15	15	15	15	15	16	16	16		
Sara Petersen	6,64	10,78	15,07	19,43	23,9	28,57	33,39	38,47	43,72	48,83	54,85	Passe 2 haies en 17!!
Droite		4,14	4,29	4,36	4,47	4,67	4,82	5,08	5,25	5,11	6,02	Dernière ligne droite dure...
	22	15	15	15	15	15	16	16	17	17		
Oordegem												
Lea Sprunger	6,35	10,59	14,86	19,27	23,84	28,65	33,6	38,6	43,84	49,28	55,21	Gros départ!
Droite		4,24	4,27	4,41	4,57	4,81	4,95	5,00	5,24	5,44	5,93	Manque de fréquence sur la fin
	21	14	14	14	14	15	15	15	15	15		Passage d' difficile de 14 à 15
Rome												
	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	400H	Remarques
Janieve Russell	6,36	10,54	14,66	18,84	23,2	27,7	32,44	37,38	42,57	47,92	54,12	0-200: 25.00 /300: 38.68 /200-400: 29.12
Gauche		4,18	4,12	4,18	4,36	4,5	4,74	4,94	5,19	5,35	6,2	
	22	15	15	15	15	15	16	16	17	17		
Sara Petersen	6,62	10,86	15,14	19,4	23,8	28,32	33,04	38	43,12	48,38	54,35	0-200: 25.58 /300: 39.26 /200-400: 28.77
Droite		4,24	4,28	4,26	4,4	4,52	4,72	4,96	5,12	5,26	5,97	
	22	15	15	15	15	15	16	16	17	17		
Theron Nel	6,54	10,88	15,36	19,82	24,46	29,08	33,28	38,64	43,47	48,76	54,58	0-200: 26.20 /300: 39.90 /200-400: 28.38
Droite		4,34	4,48	4,46	4,64	4,62	4,2	5,36	4,96	5,16	5,82	
	22	15	15	16	16	16	16	17	17	17		
Zuzanna Hejnova	6,58	10,78	15,08	19,44	23,92	28,58	33,28	38,22	43,44	48,9	55,27	0-200: 25.76 /300: 39.56 /200-400: 29.51
Droite		4,2	4,3	4,36	4,48	4,66	4,7	4,94	5,22	5,46	6,37	
	22	15	15	15	15	15	15	16	16	16		
Genève												
Petra Fontanive	6,62	10,94	15,24	19,74	24,28	29,08	33,98	38,98	43,96	48,96	54,56	0-200: 26.20 /200-400: 28.36
Gauche		4,32	4,3	4,5	4,54	4,8	4,9	5	4,98	5	5,6	
	23	16	16	16	16	16	17	17	17	17		
Lea Sprunger	6,5	10,74	15,04	19,4	23,88	28,58	33,48	38,48	43,78	49,02	54,63	0-200: 25.66 /200-400: 28.97
Droite		4,24	4,3	4,36	4,48	4,7	4,9	5,00	5,3	5,24	5,61	
	21	14	14	14	14	15	15	15	17	15		
Sacramento (US Trials)												
Muhammad	6,20	10,20	14,36	18,68	22,88	27,18	31,72	36,46	41,46	46,60	52,64	0-200: 24.58 /200-400: 28.06
Droite		4	4,16	4,32	4,2	4,3	4,54	4,74	5	5,14	6,04	Départ ultrarapide! Passe la 10 de la mauvaise jambe
	23	15	15	15	15	15	15	16	16	16		Les 40 derniers mètres sont durs!
Shamier Little	6,50	10,58	14,68	18,86	23,04	27,52	32,16	36,96	42,00	47,10	52,75	0-200: 24.84 /200-400: 27.91
Droite		4,08	4,1	4,18	4,18	4,48	4,64	4,8	5,04	5,1	5,65	Rajoute 2 pas avant la 11! 14 à la 5!
	24	15	15	15	14	15	15	16	16	16		Gros finish! Schéma de course chaotique
Kori Carter	6,42	10,46	14,42	18,46	22,64		32,32	37,28	42,22	47,24	52,95	0-200: 24.40 /200-400: 28.55
Gauche		4,04	3,96	4,04	4,18	-22,64	32,32	4,96	4,94	5,02	5,71	Départ ultrarapide! Pas de jambe droitel
	24	15	15	15	15	17	17	17	17	17		Très bonne jambe gauche (100H), mauvais virage 15/17
Ashley Spencer	6,62	10,84	15,14	19,52	23,98		32,92		42,48	47,52	53,11	0-200: 25.82 /200-400: 27.29
Gauche		4,22	4,3	4,38	4,46	-23,98	32,92	32,92	42,48	5,04	5,59	Départ assez rapide, mais 2ème partie très rapide
	22	15	15	15	15	15	15	15	16	16		Un peu trop proche des haies avec les deux 16
Georganne Moline	6,48	10,6	14,82	19,1	23,42	27,9	32,52	37,26	42,2	47,2	53,14	0-200: 25.16 /200-400: 28.06
Droite		4,12	4,22	4,28	4,32	4,48	4,62	4,74	4,94	5	5,94	Belle tactique, mais fin difficile sur le plat
	22	15	15	15	15	15	15	16	16	16		
Sydney McLaughlin	6,52	10,68	14,88	19,06	23,28	27,88	32,62	37,56	42,76	48	53,82	0-200: 25.00 /200-400: 28.32
Droite		4,16	4,2	4,18	4,22	4,6	4,74	4,94	5,2	5,24	5,82	Départ assez rapide, changement d' difficile 14-15
	22	14	14	14	14	15	15	15	16	16		Jambe gauche assez mauvaise, départ trop rapide pour finir en 15

MENTAL

- IT TAKES A PLAN TOO...
- INCREASE THE FOCUS PROGRESSIVELY
- TRUST THE PLAN, TRUST YOUR ABILITIES
- ENJOY THE PROCESS

THE CHAMPIONSHIP BUBBLE

- CLEAR PLANIFICATION
- ADRENALINE / POSITIVE PRESSURE
- BUILD UP OVER THE ROUNDS
- RECOVERY IS KEY
- HAVE A CLEAR PLAN A BUT ALSO B, C, D...

400M HURDLES – WHAT IS NEEDED?

- Desire and heart to train hard
- High level of core, max strength and strength endurance
- Mental focus
- Flexibility and coordination
- Sprint abilities
- Aerobic capacity

400M HURDLES – IDENTIFICATION OF TALENTS

1. Strong mental
2. Tall athletes
3. Good speed and good endurance
4. 2 lead legs
5. Hard workers

400M HURDLES – BIOMECHANIC

1. START

- Smooth clearance of H1 after 45m
- Speed development
- Cadence / Stride rhythm establishment

-> get to H1 with the desired lead leg

-> clear H1 « on stride »

- ✓ Great flexibility during the initial 5-9 steps out of the blocks
- ✓ Reverse the starting leg
- ✓ Use the lane width = additional 1m

400M HURDLES – BIOMECHANIC

KPI START:

1. Being able to start of either leg
2. Being able to cover more or less ground especially in the initial 9 strides from the blocks
3. Appreciating the use of lane width on the bend

But...

- Athlete's shape
- Weather conditions
- Bend / Surface...

400M HURDLES – BIOMECHANIC

2. CLEARANCE

- CLEARANCE: between 3.05m (16) and 3.20m (13-14)
 - TAKE OFF: 2.00-2.10m (last step should be shorter and under COM)
 - TOUCH DOWN: 1.00-1.10m
- > elite athletes take off closer and land much closer to the barrier compared to poor or average hurdlers*
- TRUNK ACTION: less body lean (15°)
 - TRAIL LEG ACTION: long step after the hurdle clearance
 - LEFT CLEARANCE IN THE BEND: 60cm closer to the inner line *(1m less distance for 20 steps in the bend)*

400M HURDLES – BIOMECHANIC

3. STRIDE PATTERN

- Maximize the non-fatigue velocity + limiting loss of velocity in the fatigue state
- More airtime to contribute to stride pattern
- Switch in rhythm:
 1. No transition (13 or 14 or 15 all the way)
 2. Single alternate (n+1) eg. 13 to 14 stride
 3. Paired alternate (n+1+1) eg. 13 to 14 to 15 stride
 4. Double step down: (n+2) eg. 13 to 15 strides

Number of stride: Starts to H1 - 7/8 steps = stride pattern for the first part of the race

400M HURDLES – BIOMECHANIC

3. STRIDE PATTERN

13 steps = 2.45 stride length

14 steps = 2.27

15 steps = 2.13

16 steps = 1.85

400M HURDLES – BIOMECHANIC

4. SPLITS

- Hurdles splits development: +0.10 to + 0.20
- 200m split = Time at H5 + 1,60 (top level men) or 1,7-1,8 (top level women)
- Difference between 1. 200m vs 2. 200m = ca. 5% of race time (more 6-7% for women) or ca. 2,40-2,60s (men) and 3,4s (women)
- Differences between fastest and slowest intervals: 0.9s (men) and more than 1s (women)
- $n = 12\%$ / $n+1 = 33\%$ / $n+1+1 = 35\%$ / $n+2 = 20\%$
- First rhythm change not before H5
- Add a step to maintain frequency

400M HURDLES – BIOMECHANIC

Training der Schrittrhythmen im 400m-Hürdenlauf

Aus den folgenden Tabellen lassen sich für das Training der angestrebten Schrittrhythmen die entsprechenden Hürden-abständen herauslesen. Wie beim Hürdensprint bereits erwähnt, ist es auch beim Langhürdenlauf wichtig, den indivi-duellen Voraussetzungen angepasste Hürdenabstände für Rhythmus- und Lauftrainings mit Hürden auszuwählen. Nur so kann effizient, dem Können und dem Formstand entsprechend trainiert werden!

Hürdenabstände für unterschiedliche Zielrhythmen bei den Männern

Könerstufen:	I=Einführung II=Mittlere III=Köner			Ziel: Entwicklung des 15er-Rhythmus'			Ziel: Entwicklung des 14er-Rhythmus'			Ziel: Entwicklung des 13er-Rhythmus'		
Könerstufe	I	II	III	I	II	III	I	II	III	I	II	III
Schrittlänge in m	2.05	2.10	2.16	2.20	2.26	2.31	2.39	2.44	2.49			
Rhythmus	Hürdenabstand in m											
4 Schritte	10.95	11.10	11.30	11.60	11.80	11.90	12.35	12.50	12.65			
5 Schritte	13.00	13.20	13.45	13.80	14.05	14.25	14.75	14.95	15.15			
6 Schritte	15.05	15.30	15.60	16.00	16.30	16.55	17.15	17.40	17.60			
7 Schritte	17.10	17.40	17.75	18.20	18.55	18.85	19.55	19.85	20.10			
8 Schritte	19.15	19.50	19.90	20.40	20.80	21.15	21.90	22.25	22.60			
13 Schritte							33.85	34.45	35.00			
14 Schritte				33.60	24.40	35.00						
15 Schritte	33.50	34.20	35.00									
Annahme:												
Länge Hürdenschritt		3.10			3.15			3.20				
Länge 1. Schritt		1.72			1.85			1.99				
Total		4.82			5.00			5.19				

Tabelle 1: Empfehlung für Hürdenabstände der Männer 400m Hürden (15er-13er)

Hürdenabstände für unterschiedliche Zielrhythmen bei den Frauen

Könerstufen:	I=Einführung II=Mittlere III=Köner			Ziel: Entwicklung des 17er-Rhythmus'			Ziel: Entwicklung des 16er-Rhythmus'			Ziel: Entwicklung des 15er-Rhythmus'		
Könerstufe	I	II	III	I	II	III	I	II	III	I	II	III
Schrittlänge in m	1.80	1.85	1.90	1.92	1.97	2.02	2.05	2.10	2.16			
Rhythmus	Hürdenabstand in m											
4 Schritte	9.95	10.10	10.25	10.45	10.60	10.75	10.95	11.10	11.30			
5 Schritte	11.75	11.95	12.15	12.35	12.55	12.75	13.00	13.20	13.45			
6 Schritte	13.55	13.80	14.05	14.25	14.50	14.80	15.05	15.30	15.60			
7 Schritte	15.35	15.65	15.95	16.20	16.50	16.80	17.10	17.40	17.75			
8 Schritte	17.15	17.50	17.85	18.10	18.45	18.80	19.15	19.50	19.90			
13 Schritte							33.50	34.20	35.00			
14 Schritte				33.45	34.20	35.00						
15 Schritte	33.35	34.15	35.00									
Annahme:												
Länge Hürdenschritt		3.02			3.05			3.10				
Länge 1. Schritt		1.54			1.62			1.72				
Total		4.56			4.67			4.82				

Tabelle 2: Empfehlung für Hürdenabstände der Frauen 400m Hürden (17er-15er)



QUESTIONS?

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