

The elastic strength development of Jonathan Edwards

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by Carl Johnson

“ This is a very pragmatic exposition of the training carried out by Jonathan Edwards from 1986 up to his world record jump in 1995. The basic element of his preparation was the development of maximum muscular strength and power, without putting his legs and ankles at risk of injury. The exercises, loads and details of recovery used to achieve this goal are described in detail. ”



Photo: Scuola dello Sport

Carl Johnson has been a British Athletic Federation (BAF) national coach since 1969. Between 1972 and 1995 he had spells as national event coach for the hammer, chief coach for the throws and technical director coach education. He is now the BAF chief education officer. Among the many international athletes he has coached is Jonathan Edwards, World Champion and world record holder in the triple jump, 1995.

1 Introduction

This is not a theoretical paper. It is a blow by blow account of what we have done through 10 years of training, with no explanation other than it appears to have worked.

I commenced coaching Jonathan in autumn 1986, when he came into the British Region for which I have a responsibility as a national coach. He arrived as a 19 year old to study at Durham University. Until then his training had reflected the haphazard recreational nature of the typical British independent school.

Within six months an enforced consultation with an orthopaedic specialist interested in sports medicine advised us to abandon any ideas of pursuing an interest in triple jump. The athlete declined this advice and I was left to find a solution. I resolved at that stage to avoid the normal specific training for the event, and develop the necessary strength via the weights room, in order to avoid stressing the bones of the lower leg and feet. From that moment an atypical training programme was fashioned, and this provided the basis out of which regular 18 m jumping has been forged.

For the next three years his training was pretty conventional in terms of strength development, but unconventional from the event standpoint. He worked in the weights room thrice weekly, structured roughly as depicted in *Figure 1*, backed up by the following once weekly (Thursday) gym session:

- I) 10-15min general mobility.
- II) 15-20min bounding.
- III) 30-40min extensive body circuit of 12 to 16 exercises.

The nature of the second series of activities (bounding) changed three times as each training year progressed, in the following manner:

- a) From *October-January*, the focus was upon extent (3-4x12 contacts - hopping on right leg, then left leg, then stepping, then combinations of two hops followed by 2 steps).
- b) From *January-March*, the focus changed to drop jumps (box to box) from progressively higher heights (60cm maximum).

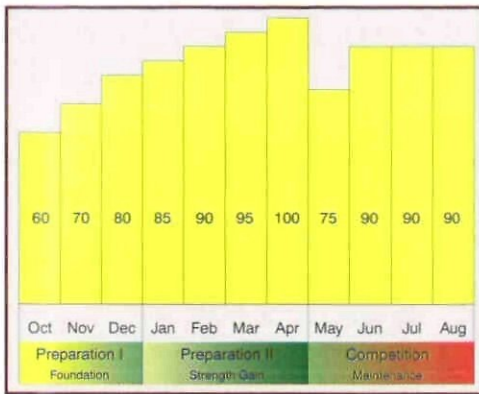


Figure 1: General structure of J. Edward's strength development

c) From *March-May*, repetition stepping (box to ground, to box to ground, to box to ground, to box) at spacings optimum to his state of training at the time. Box heights were 20-30cm.

The series c) activities were added to the programme round about 1990.

Loadings for the body circuit (series III above) are set at half of a 45 second test maximum, established during each fourth week of training, which is taken as a "rest and test week". In subsequent weeks the full routine is repeated continuously three times, (i.e. without rest at the end of each set) and an overall time taken. From December onwards the number of circuits is increased

to four on the third week of each three week block of work, see *Figure 2*. The performed exercises are illustrated in *Figure 3*.

This gym session has remained consistent throughout Jon's training. The only deviations from it have been that the mobility session has not been strictly adhered to over the past two years, and the special bounding (series c) was expunged by Jonathan himself in 1995, partly because an enforced change of facility reduced the training time available to us, and it was this session which was discarded.

The Thursday bodyweight session continues within the annual training programme right up to the commencement of the competition phase of training.

The "key" change in Jonathan's training took place in 1989. It resulted from my reading about work carried out by Warren YOUNG, then of the Department of PE and Recreation, Mount Helen, Victoria, Australia, which was first published in the Australian magazine - Aussie Thrower, Vol. 4, N° 1 and then in our British Thrower magazine N° 44, May 1989. It drew a great deal on some of the work of Dietmar SCHMIDTBLEICHER, working in conjunction with other researchers, principally M. BÜHRLE, G. HARALAMBIE and K.J. MÜLLER. Their main conclusion to impress me was that:

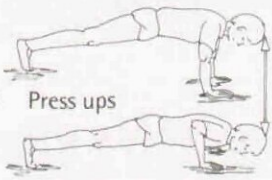
maximum strength is a fundamental component of power, and *there is no limiting influence upon power resulting from maximal strength gain.*

	November			December			January			February				
THURSDAY 1989 - 1990	9	23		7	21		4	18			15			
N° SETS - TEST	3	3	3	T	3	3	3	T	3	3	3	4	T	3
Press ups														
Hip lifts														
Med. Ball twist & throw														
Upper hamstrings														
Octagonal jumps														
Revert to foot support														
Chinnies														
Dorsal raise														
Treadmills														
Crunches														
Lower hamstrings														
Calf raise														
Triceps press														
Wobble Board														
Jump squats														
WORKING TIME														

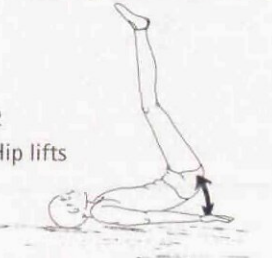
Figure 2: Scheme of the progress of body circuits

Body circuit exercises

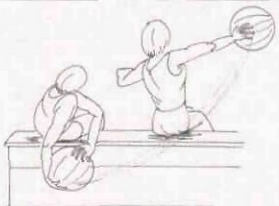
1 Press ups



2 Hip lifts

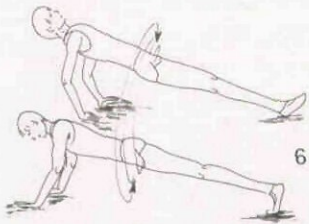


3 Medicine ball twist and throw



Upper hamstrings

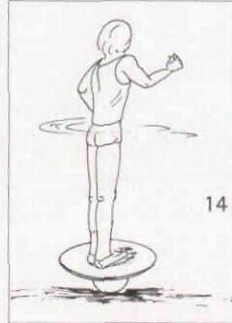
5 Octagonal jumps



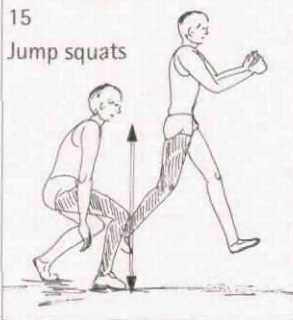
6 Revert to foot support



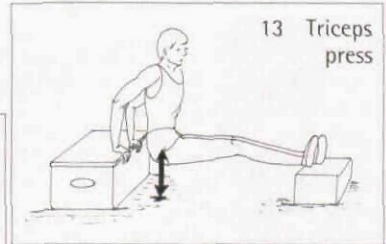
7 Chinnies



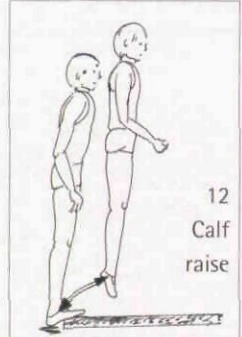
14 Wobble Board



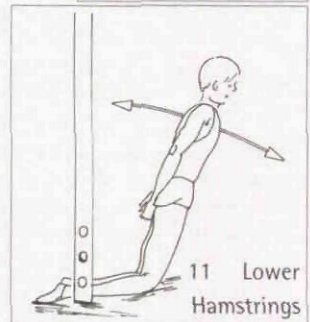
15 Jump squats



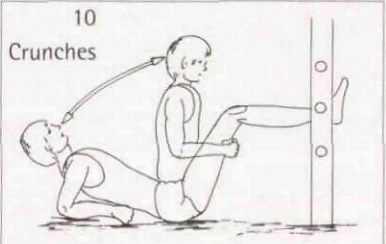
13 Triceps press



12 Calf raise



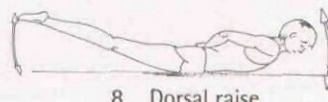
11 Lower Hamstrings



10 Crunches



9 Treadmills



8 Dorsal raise

Drawings:
Dieter Kruber

The idea that training for maximum strength did not inhibit the development of power was an entirely new concept to me, and intrigued me greatly. The proposition was supported by two other precepts, the first of which was well known and understood:

- a) the attainment of absolute muscle exhaustion was necessary for the achievement of maximal strength improvement, brought about through increased cross-sectional muscle size (hypertrophy) and as the result of working 12 set loads of between 75% to 85% of maximum, and...
- b) maximum strength is also improved by:
 - the activation of the greatest number of muscle fibres at any one time,
 - which is best achieved by working at 95% of maximum plus,
 - for between 1 to 3 reps,
 - in explosive efforts,
 - in a fatigue free state, and
 - without resulting in hypertrophy.

It was also inferred that much of the training effect in "b" (30%) was neurological - involving the improvement of the nervous control which brought about muscle contraction and recruitment. To my mind the opportunities inherent in "b" for us were considerable:

- activation of the maximum number of muscle fibres at any one time,
- the potential for training neural involvement,
- the potential to improve elastic strength (power),
- without hypertrophy (see weight change in Table 2), and all attainable in the weight room.

My interpretation of what SCHMIDTBLEICHER and his colleagues suggested took me along the following route, influenced by past experiences of my own, in which talented athletes had benefited from training with weights twice a week rather than 3 times a week or more. The result of this was that, for the next 2 or 3 years, we worked quite rigidly to the following routine during preparation II of training (i.e. January until the beginning of the competition season):

- a) **Tuesday:** Power snatches, power cleans (sometimes clean and jerk) and half squats; 1 set of 10 repetitions to complete exhaustion. The lifts were chosen because (with the exception of squats) they were capable of being executed *explosively*. Further to this, I did not see the point of attempting more sets following rest, if complete exhaustion had been attained by the 9th or 10th repetition of the 1st set. My reason for this was nothing more than "gut feeling".

- b) **Saturday:** Power snatches, power cleans (sometimes clean and jerk) and half squats; 6 single lifts starting at 95% maximum, reaching maximum by lift 4 and progressing to maximum (+) and over (++) , the final 2 lifts in the following way:

- 1st lift @ 95% maximum followed by 4-6min rest.
- 2nd lift @ 95% maximum followed by 4-6min rest.
- 3rd lift @ 95% maximum followed by 4-6min rest.
- 4th lift @ 100% maximum followed by 4-6min rest.
- 5th lift @ 100% + maximum followed by 4-6min rest.
- 6th lift @ 100% ++ maximum.

If the athlete was off form, or unwell, the session was terminated at the 4th lift.

During 1990 and 1991 this structure was retained right through Preparation II into the Competition phase of training (May/June) i.e. for some 18 to 24 weeks.

The progression, through a single periodised year, was that from October to December he went through through a gradual, conventional build up, increasing lifting quality and reducing volume through to the turn of the year. Thereafter, 4 to 6 weeks of short pyramids (4-3-2-1) bridged into the "maximal strength" work.

In 1992, because he had time available, we tried a modification, whereby he did one or two lifts daily. We tried this in an attempt to avoid the accumulated fatigue which always affects lifting quality over the later lifts in a session. It was not unsuccessful, nor was it outstandingly successful, measured subjectively.

As the years have gone by he has moved towards extending the length of time when he lifts 4x4 reps and short pyramids, and reducing the length of time when he has worked on 6 singles. 10 reps to exhaustion have gone out of the routine over the past two or maybe three years. The decision to do this was taken by Jonathan himself. Some athletes are very good at self monitoring, and Jonathan in one of these. He is trusted to do this effectively.

In 1995, under the influence of a power lifter with whom he trains, he has spent more time lifting 3x3 reps, but this still represents 9 lifts at above 95% of maximum as opposed to the 6 that I advised. It is not greatly different.

His running programme has been equally intensive, the result of his own aversion to anything extensive more than anything else. Over the years he resisted any effort on my part to get him to run anything greater than 200m. I got him to run up to 6 repetitions of 200m by about 1990. Since then he has rarely run the distance. As you will see from his 1995 programme, anything above 100 m was a rarity. There are no sprinters of any reasonable ability in the region with whom to train, and he has thus never had

Table 1: Jonathan Edward's training 1995 (Loadings in Kilograms)

January	
15	
16	Some indeterminate lifting
17	
18	
19	
20	
21	
22	
23	Snatch 85
24	Test - 74kg - 11.5% body fat ratio - 67 sit ups - 48 press ups - 13.71m overhead shot throws - 3.65sec 30 m - 2.99m standing long jump
25	Clean 115 - high snatch 75
26	
27	
28	
29	
30	Fly to Tallahassee
31	
February	
1	Clean 3x6x85 - high snatch 3x6x55 - bench 3x6x60 + 6x50 m
2	Endurance bounding (sets of 12 repetitions) + circuit
3	4 x 130 m
4	
5	
6	Snatch 3x6x60 - high clean 3x6x80 - bench 3x6x60 + jumping routine from 6
7	5 x 50 m fast
8	Clean 3x6x90 - high snatch 3x6x55 - bench 3x6x60 + 5x50m relaxed
9	3x12 hops right and left - 3x12 steps - no hop step since legs sore + attempted circuit but felt faint
10	Snatch 3x6x60 - high clean 3x6x80 - bench 3x6x65 + 5 x 140 m
11	
12	
13	Clean 3x6x90 - high snatch 3x6x55 - bench 3x6x65 + jumping session off 6 = 14.70
14	4 x 50 m fast (legs sore)
15	Snatch 3x6x60 - high clean 3x6x80 - bench 3x6x60 + easy strides
16	Endurance bounding + circuit
17	6 x 130 m relaxed and fast
18	High clean 3x6x85 - bench 3x6x65 - abdominals because of restricted facilities
19	
20	Clean 3x6x90 - high snatch 3x6x60 - bench 3x6x70 + jumping session off 6 & 10
21	Racket-ball
22	Snatch 1x6x70: 2x6x65 - high clean 3x6x80 - bench 3x6x70 + 4x50m relaxed 90% effort
23	Endurance bounding + circuit
24	
25	
26	
27	Leave Tallahassee
28	Arrive UK
March	
1	
2	
3	
4	
5	
6	
7	Clean 4x4x90 - high snatch 4x4x65 - bench 4x4x75 + medicine ball work
8	6 x 100 m 80% in snow
9	Snatch 4x4x70 - high clean 4x4x95 + circuit
10	5 x 60 m fast (quite tired) ++ jumping session from 6 - 14.60: 15.20: 14.80: 15.05
11	Clean 4x4x100 - high snatch 4x4x65 - bench 4x4x75
12	
13	Snatch 4x4x70 - high clean 4x4x95 - bench 4x4x75
14	6 x 100 m
15	Clean 4x4x100 - high snatch 4x4x65 - bench 4x4x75
16	Circuits
17	6 x 60 m + jumping session 15.00: 15.05
18	Slight back injury
19	
20	4 x 100 m (back sore + ham twinge)
21	Test - 74kg - 12.5% body fat ratio - 68 sit ups - 53 press ups - 3.02 standing long jump
22	
23	Circuit test ++ bench 92.5
24	5 x 60 m ++ jumping session 16.60 from 10 very flat + test completion 15.25 overhead shot - 3.62 30 m
25	Light lifting session

- 26
27 "Working weights back in" - bench 4x80 - 3x85 - 2x90 - 1x92.5 - 1x95 (fast)
28 Snowing - short indoor bounding session
29 High clean 3x80/85/90 - snatch 3x60/65/70 + 6 x 60 m relaxed
30 6 x 60 m ++ circuits
31
- April**
9
10 Clean 3x3x115 (very explosive) - high snatch 3x3x75 - bounding (some fatigue after Saturday)
11 6 x 60 m
12 Snatch 1x3x80: 2x3x82.1 - bench 3x3x75 - high clean 2x3x105 + strides (slight quad twinge)
13 Circuits
14
15 Bench 1x3x87.5 - easy clean and snatch
16
17
18 Test - 71.12kg - 10.1% body fat ratio - 72 sit ups - 57 press ups - 15.16 overhead shot throws - 3.54 30 m -
3.06 standing long jump
19 Test 90 snatch & 100 bench (no fails) + easy strides
20 Circuit test including Ergojump which ruined legs
21 Sore legs wiped out jumping session
22 & lifting session
23
24 Clean 4x110 - 3x115 - 2x120 - 1x125 - 1x130 - bench 3x3 (2) x90 + hurdle bounds & strides
25 2 x 60 m easy + 4 x 60 m fast
26 Snatch 3x3x82.3 - high snatch 3x3x75 - hurdle jumps + skill session on arms
27 Circuits
28 Jumping session 63.5kg couldn't jump because bad position at take-off:14st- 16.50: 16.30: 16.30: 16.30: 16.30
29 Clean 3x3x115 - bench 3x3x90 + strides (fatigued)
30
- May**
1 Snatch 3x3x82.5 - high snatch 3x3x75 - hurdle jumps & strides
2 5 x 60 m fast (very good)
3 Clean 3x3x115 - high clean 3x3x105 (both good) + hurdle jumps & strides
4 Circuits (2 x only not too well)
5
6 Snatch 3x3x82.5 - bench 3x3x90 + hurdle jumps
7
8
9 High snatch 3x75 - 2x77.5 - 1x80 - 1x82.5 + 5x50 m
10 Clean 3x3x115 - high clean 3x3x105 (adductor stiff)
11 Circuits x 4
12 Bench 3x3x90 ++ jumping session 10st 15.60: 16.10 (several run-throughs) 14st 16.65: 16.60 (legs tired)
13 Snatch 3x3x82.5 - high snatch 3x3x75 (very tired)
14
15 Weights test clean 132.5 & bench 102.5 (slow)
16 Test - 73kg - 9.6% body fat ratio - 73 sit ups - 62 press ups - 15.33 overhead shot throws - 3.59 (outside cold)
3.14 standing long jump (fatigued)
17
18 Circuit test
19
20
21
22 Snatch 92.5 - bench 4x85 - 3x90 - 2x95 - 1x100 - 1x102.5 + hurdle jumps & strides
23 4 x 60 m
24 High clean 4x100 - 3x105 - 2x110 - 2 fail at 115 (mentally slack) + hurdle jumps
25 Circuit
26 Jumping session 14st 16.45: incomplete trial: incomplete trial: 17.05: incomplete trial: incomplete trial
(6.35/4.65/6.05)
27 High snatch 4x70 - 3x75 - 2x80 - 1x85 - bench 4x85 - 3x90 - 2x95 - 1x105 (fail) - 1x105
28
29
30 30 m 4.12 - 60 m 6.94 (4.08) - 60 m 6.91 (4.05) - 60 m 6.94 (4.07)
31 Clean 4x115 - 3x120 - 2x125 - 1x130 (fail) - 1x130 (fail)
- June**
1 Circuits (very stiff)
2 Jumping session 14st 16.55: 16.70: incomplete trial - 18st 16.50: 16.70: incomplete trial very fast (still stiff)
3 Snatch 4x80 - 3x82.5 - 2x85 - 1x90 - 1 close fail 95 (vv good) - bench 5x85 - 4x90 - 3x95 - 2x105 - 1x107.5 +
stretching (good)
4
5 Clean 5x110 - 4x115 - 3x120 - 2x125 - 1x130 - 1x132.5 - (very very good) + hurdle jumps & strides
6 30m 4.04 -60m 6.87 (4.01)(10.45mps)-60m 6.84 (4.02)(10.64mps)-60m 6.95 (4.06)(10.38)
7 Snatch 5x75 - 4x80 - 3x85 - 2x90 - 1x95 (fail) 1x95 (excellent) + few strides
8
9 Clean 5x110 - 4x115 - 3x120 - 2x125 - 1x130 9am training (physically & mentally low)
10 Bench 5x85 - 4x90 - 3x95 - 2x100 - 1x105

11	Meeting AAA vs. Loughborough 17.01 (+1.4) NJ 17.58 (+1.2)
12	
13	Snatch 5x75 - 4x80 - 3x85 - 2x90 - 1x95 (lifted well but slightly lethargic)
14	60 m 6.34 - 60 m 6.76 (4.00) (10.86 mps) - 60 m 7.02 (headwind)
15	Clean 5x110 - 4x115 - 3x120 - 2x125 - 1x130 - 1x135
16	Snatch 5x85 - 4x90 - 3x95 - 2x100 - 1x105 - 1x110 fast + strides
17	Competition Lille - 16.90: 17.46: 17.22 (70 off board) wet conditions, didn't carry speed through well
18	
19	Snatch 90 - 97 - 3 fails at 100 (2nd very close)
20	30m 4.02 - 60m 6.88 (4.02)(10.48mps) - 60m 6.90 (3.99)(10.30mps) - 60m 6.89 (4.02)(10.45mps)
21	Bench 110 + strides (hay fever)
22	Clean 125 - 3 fails at 135 + few strides
23	Travel to Lille
24	Warm up and strides in spikes
25	17.90 (+2.5): 18.43 (+2.4): 17.72 (+0.5): 18.39 (+3.7)
26	Sore left achilles tendon
27	
28	Snatch 3x3x85 (1st set lethargic others better)
29	Bench 3x3x95 (good) + 3x50 m (good) ankle still sore
30	Clean 3x3x120

July

1	Warm-up + strides in spikes
2	Competition Gateshead - no jump: 17.60: 18.03 (+2.9): 17.72: no jump: 17.74 shattered after 3rd round
3	
4	Snatch 3x3x85 (v. good) - bench 3x3x95 (good) + hurled jumps
5	4x30 m in 4.06: 4.07: 4.03: 4.06
6	Warm-up and strides (very tired)
7	Competition London - 17.18 (40cm off board) - 17.69 (+0.5) - 17.28 withdrew
8	
9	
10	Clean 3x3x120 & 1x130
11	Strides (very tired & legs heavy)
12	
13	
14	Snatch singles ending with 3 attempts at 100 3rd of which was very close
15	Bench singles with very close to 110 + fast strides
16	Travel to Salamanca
17	Gentle stretch
18	Competition Salamanca - 17.39 (+1.9) : 17.98 (+1.8): no jump: no jump: withdrew
19	
20	Clean singles - 120 - 122.5 - fail 132.5 - 2 fails at 140 (poor tired)
21	Snatch singles - 107 - close fail at 112 + 3x50 m (felt good)
22	Travel to Sheffield
23	
24	
25	
26	
27	Strides
28	Travel to Sestriere
29	Competition Sestriere - 15.97: no jump: 17.41: NJ
30	
31	

August

1	
2	
3	Arrive at Göteborg, feeling tired & nervous
4	
5	Group A qualifying 17.46 (good but old technique crept in)

anyone to train with who can take him beyond himself in a running session.

Perhaps this has been a feature of all of his training throughout his career – always within his own ability, which ensured good quality – but never beyond it. Such has certainly been a feature of my own approach to loadings. I have been at pains to avoid injury – so we have “backed off” whenever there was the slightest hint of trouble. I have also been careful to err on the safe side when it came to assessing loadings, and Jon’s inherent care for himself ensured that we would not venture beyond “comfort”.

This brings me to what I believe to be the second “key” to his success – that of recovery. Perhaps the enforced six month lay off, resulting from contracting Epstein Barr syndrome in 1994, was one catalyst for his tremendous improvement of 1995. But even before that occurred, time off featured highly in his programme. His 1995 programme, reproduced here in *Table 2*, shows liberal amounts of time away from training.



Table 2: Four weekly performance test

	<		1992-1993					>		< 1993-94 >		<		1995			>	
	Pre PB	Oct	Nov	Dec	Jan	Apr	May	Dec	Dec	Jan	Jan	Mar	Apr	May	Jun	Jul		
Test date		18		6	17			8	6			28						
WEIGHT	11.5	11.5		11.7	11.6	11.5		11.11	11.6	11.12	11.7	11.71	11.13	11.5				
SKINFOLD	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	5.0	3.0	3.0				
Biceps	9.0	6.0		9.0	8.0	7.0		7.0	9.0	8.0	7.0	7.0	9.0	7.0				
Subscapular	8.0	8.0		8.5	8.5	9.0		8.0	9.0	9.0	10.0	10.0	8.0	9.0				
Suprailiac	6.0	6.0		6.5	8.0	7.0		5.0	7.0	4.0	7.0	7.0	9.0	7.0				
TOTAL	26.5	27.0		25.0	26.5	26.0		23.0	28.0	24.0	27.0	29.0	24.0	23.0				
% age	11.0	12.0		11.0	11.0	11.0		9.6	12.0	10.1	11.5	12.5	10.1	9.6				
60sec SIT-UPS	61	63		62	61	63		61	60	63	67	68	72	73				
MAX PRESS-UPS								54	37	23	48	53	57	62				
OVERHEAD SHOT 6.25 Kg	1331	1395		1393	1396	1343		1433	1293	1314	1371	1525	1518	1533				
30m SPRINT	3.67	3.65		3.66	3.67			3.37*	3.71	3.68	3.65	3.62	3.54	3.59	4.08++	4.01++		
STANDING LONG JUMP	286	290		298	296	301		297	297	294	299	302	306	314				
Shuttle run	11.1	10.0		11.2	7.1	10.7		10.0		2.7								
ESTIMATED VO ₂ Max	50.8	47.0		50.8		49.0		47.0										
LIFTING MAXIMA [kg]																		
BACK SQUAT																		
Front Squat	222.5	200.0	210.0	230.0	230.0	230.0												
LEG PRESS																		
High Pull																		
CLEAN	115.0		110.0	112.5	117.0	120.0	122.5				115.0	125.0	130.0	132.5	<135	<132.5		
HANG CLEAN											100.0	115.0						
CLEAN & JERK		90.0	100.0	100.0		100.0												
JERK																		
SNATCH	82.0	75.0	80.0	82.5	82.5	82.5	85.0				85.0	90.0	90.0	92.5	97 (<100)	<112		
HANG SNATCH											75.0	80.0	82.5					
BENCH PRESS	85.0											92.5	100.0	102.5		<110		
Pullover																		
Bent Rowing																		
Seated PBN																		

* = Hand timed as opposed to infra-red timing.

++ = Self timed outdoors as part of a 60m run.

All runs were made from a standing start 1m before the first beam.