

## Devising a PEP

There are a number of principles and types of training that should be considered when devising a training regime. The principles of training are the laws that a training schedule has to abide by to be successful. If these laws aren't followed the training schedule is very likely to become totally useless to an athlete. SPORT explains the main five principles of training, which are:

Specificity  
Progression  
Overload  
Reversibility  
Tedium

These words all apply to training in different ways, and are very important when devising a training regime for an athlete:

- **Specificity** means that any training that takes place should be specific to the sport that the athlete is training for. For example it wouldn't be appropriate for a tennis player to train by playing football, as it is a different sport, uses a different energy system, and different parts of the body. Specificity is aimed at all aspects of the sport from the muscles used to the energy system the sport involves. This means that to target the muscle groups present you should train by doing exercise that is similar to what you would do in your sport. For example weight training could improve power for a rugby player. To target specific energy systems you have to use the same energy system in your training as you would when undertaking the sport. For example, a footballer could train using fartlek training to target the anaerobic lactic acid system, as you run at varying speeds in football like in fartlek training
- **Progression** means that for improvements to keep occurring the intensity of training needs to be gradually increased. This is because if you keep training at one thing your going to adapt to that exercise and if you don't make it harder you will stay at this level and wont improve. For example, when weight training if you constantly train at one weight you will soon are able to lift it easily and won't progress past that point.
- **Overload** is the term used to describe training that is more strenuous than the usual physical activity undertaken by an athlete. By using overload in training you place more strain on the human biological system and this system adapts, becoming more capable of coping with this strain. Overload has a different affect on many parts of the human biological systems including the energy systems, muscles, respiration system and recovery enhancement. For example, in response to the demand of oxygen more alveoli in the lungs are utilized and there is a slight increase in lung volumes. This means the breathing system becomes more efficient.
- **Reversibility** explains why performance gets worse when training stops, or stops for a period of time. It has been found that by training for a long period of time you will stay at that level for a longer time than if you trained for a lesser period of time. This is because exercise regimes that begin a long time before stopping enable the body to keep the increased fitness for a long time after training stops. Shorter training regimes do increase fitness but biological

adaptation doesn't really take place.

- **Tedium** explains that training should change over time because of both physical and psychological reasons.

Physically the effects of repeated or prolonged strain on the biological system are fatigue, depletion of energy systems, injury, soreness and muscles don't respond as easily as they should (it takes more stress to use muscles as they should).

Psychologically the effects are emotive stress because of coping with exhaustion, and lack of motivation.

When making a training schedule it's also a good idea to bare in mind the FITT regime, this stand for:

**F**requency of training

**I**ntensity of training

**T**ime management of training

**T**ype of training

These are all to be considered when devising a training regime and the athlete will improve more if these are considered:

- **Frequency** of training refers to how often the training must take place in order to get what you are aiming for. For example, to improve all-round fitness training won't have to take place as often as an athlete trying to reach their peak performance does. Also the type of activity undertaken will affect the frequency of training. For example, endurance training can take place a lot more often than anaerobic training.
- **Intensity** of exercise depends on the type of training occurring. This means that if you are doing anaerobic training the training will be more intense as its all about power, whereas if you are doing aerobic training the training should be less intense as you are targeting endurance at a lower level.
- **Time** management of training refers to the amount of time spent on each part of the training regime and how long the regime lasts for. This is changed with the intensity and type of training used. The more intense the exercise the less time will be spent on that exercise and the less long the session will last.
- **Type** of training refers to what exercises are used within the training regime to improve your performance in a sport. The way of choosing the type of training is by targeting what you want to improve and then choosing an exercise that will improve this muscle group or energy system etc.

One way of checking that your training regime is a right for a certain person you can use SMARTER, which stands for and means:

- **Specificity** - is the regime relevant to the athletes sporting needs?
- **Measurable** - is it possible to measure the effects of the training i.e. how much the individual is improving etc
- **Accessible** - are the facilities for the training readily available to the individual.
- **Reversibility** - has the regime been made so that the individual can remain fit and not go back to their original fitness?
- **Time** - do all of the elements of the regime fit in with the individuals life, and will it be long enough, or too long to reach the fitness level required.

- **Exiting** - will it keep the individual entertained so that they do not grow bored of the exercise and keep motivated?
- **Recorded** - can all the elements of the training be recorded so that you can see how well you are doing and if you come back to it you know what to do again.

Once all of these elements of the training factors are considered you are on the way to devising a training regime. There are more specific things to consider, like body systems and muscles, however these will very much set you on your way. The next thing to look at and bare in mind when devising a training regime is the factors affecting training.

## **Factors affecting training:**

There are endless factors that effect training in positive and negative ways. I will now briefly state some of the main factors and then in more detail the factors that will be most relevant to me:

- **Environment** - the environment that an individual trains in is going to affect how they go about training, and ultimately how effective it is.
- **Motivation** - if a person doesn't really want to do the training they will go about training in a less committed way than someone who really wants to.
- **Gender** - if someone is female their training will obviously have to be changed from that of a male because of physical and mental differences.
- **Age** - if you are young or old changes will have to be implemented to a schedule.
- **Lifestyle** - the way you live will affect training in that if you are unhealthy it won't be as affective as if you were.
- **Fatigue** - if you are tired from training or your everyday life you will under perform.
- **Preparation** - how someone prepares affects their training because if they don't warm up they could get injured, or if they have just eaten they wont perform as well.
- **Injury/illness** - these will affect how well your training goes so training should be adapted around these.
- **Level of performance** - if you are an elite athlete you will respond better to more intense training but a lesser athlete might be over worked.
- **History of training** - if you have never done a type of training before you cant be thrown in at the deep end you have to adapt to that type of training.
- **Time of year** - where an individual is in their sporting season will affect their training, as they will have different needs at different times of year.

Factors that affect myself the most are the following:

- **Environment** - as a male teenager it is probably a good thing that the main environment available is the school gym. This is because as my school is an all boys' school there will be no females around. This will mean that I will only have training to concentrate on and so this will ultimately help my training. There is

another side to this however, there is bound to be a less need to push myself but it means that I am more likely to follow my training schedule properly and avoid injury etc.

- **Motivation** - as this is a part of my as level I have plenty of reason to be motivated, as I want to do well to give me a good platform to do well in my exam. This means I should be focused on my goals, also for added incentive I have the fact that my sporting performance should improve. This should be motivation enough as I am always looking to perform well for my team and hopefully play for the school.
- **Injury/illness** - I am free of both but if an illness occurs I will stop training, if an injury occurs I will use the training schedule to get back to full fitness.
- **Level of performance** - I am currently competing at a quite low level of sport and I am also young so I will make sure that I do not go over the top with the intensity. I will however make it a difficult as I can for the level I am at so that I am pushing myself up to a better level of performance.
- **History of training** - I train every week with my football team and I used to be a regular at the gym so there aren't many types of training that are unfamiliar to me. This means that I can start training at quite a high level and so start improving more rapidly.
- **Exams** - I will be doing this training regime before my exams start and so this won't likely affect my training, but if I was to continue it on after I would have to arrange it around revision etc.
- **Relativity to me** - there are many factors that can affect my training but the main thing that I have to make sure I do when devising my PEP is make it all relative to myself. If I were to do it for the everyday midfielder it would still be different to me because of different body types and lifestyles.
- **Seasonal Factors** - I will be doing this PEP as a mid-season schedule as I will be maintaining my current level of match fitness, while improving in any area that is possible. Other times in the season will have different needs and so my PEP would be different.

## **Weight Training:**

After looking at the things in my game that I need to improve I have decided that I should use weight training as the type of training to improve these areas. This decision was affected by looking at how I could improve these areas and looking at

the facilities available to me. There are a number of pros and cons to weight training that are:

### **Cons of weight training:**

1. You need technique to improve properly in weight training. This is because if you hold the weights wrong or do something else wrong you could cause yourself an injury. Also lack of technique leads to you not improving as much as you should do. However I have used weights in the past and know how to do it right so it should be fine.
2. If you do the exercise wrongly you might not know instantly but it can cause long term damage.
3. You need to have a good range of equipment otherwise you won't be able to train specifically enough to your sport and you might get bored with what you are doing. Also it has to be of high quality because you don't want to get injured and you need to be able to train to the best of your abilities.
4. You can't improve your skill or technique in your sport and so your physical condition will improve but this might not be what you need to improve. However I feel that improvement of my fitness will improve my sporting ability so this is fine.

### **Pros of weight training:**

1. Weight training can be made specific to your sport. This means that certain muscle groups and energy systems can be targeted to improve your sporting ability in the areas you feel is necessary. This is done by using the right weight exercises with the right amount of sets and reps for that group/system. This means I can target football and reap the benefits.
2. You can adjust the training to things that might happen in your life. If you got injured you could work around the injury or you could bring the injury back to normal fitness.
3. It is time efficient, in that you can fit it around your schedule, and in 30 minutes you can have done full bodywork out. Obviously it depends on whether you are doing aerobic training or anaerobic training etc. On a whole compared to other types of training it will take a lot less time, this means it will fit in during school time.
4. It will add variety to my usual schedule, this is because I am used to running and skill exercises. This should keep me interested and therefore I should be more motivated to succeed in improving.
5. If you want you can train on your own in weight training. This is because I will mostly be using machine weights rather than free weights and so I will not need to be spotted. This is good because if someone wanted to train past the regime they could do it out of lessons etc.

Baring all these factors in mind I feel that weight training is the best form of training to improve the areas of my game that I pointed out earlier to need to improved.

### **Application of weight training:**

#### **The energy systems:**

There are three energy systems that are used in exercise and each one needs to be targeted in different ways:

1. **ATP/PC System (Creatine Phosphate System)** - this is the energy system that deals with instant energy needs. It will be used most in activities that require explosive power. For example in shot put where the action lasts a few seconds but needs a lot of power. Energy is stored in the muscle cell, then when there is an energy need in the cell the ATP attaches to myosin. This makes the cell contract, then the myosin discharges and ADP returns to be recharged.

**Advantages** - Responds very fast to energy demands. Produces no toxic waste products. Stores can be replenished very quickly during recovery. All reactants are found in the cell.

**Disadvantages** - can only be used for activities lasting 8 seconds or less.

2. **Anaerobic Lactic Acid System** - This is a short term energy system which is used in situations your muscles need to work at a high level for 1 to 3 minutes. The muscle cell uses the ATP but it runs out quickly and the cell runs out of oxygen, so the cell compensates. This makes lactic acid, which is counteracted by oxygen, which is why you need to rest for a short period of time to make up the oxygen debt while doing the exercise, and for a long period of time after.

**Advantages** - Responds moderately fast to energy demands. Can be used for activities lasting 1 to 3 minutes. All reactants found in the cell.

**Disadvantages** - Produces very toxic waste product (lactic acid). Recovers very slowly (15 minutes to 1.5 hours).

3. **Aerobic Energy System** - This is used when the body is exercising at a steady state for a long period of time. To keep this up a steady flow of oxygen is needed to keep the energy levels up.

**Advantages** - Can supply energy indefinitely. Produces only mildly toxic waste products. Needs no recovery.

**Disadvantages** - Very slow in responding to energy demands. Requires nutrients from outside the cell (oxygen, glucose and/or fats).

### **Targeting Energy Systems:**

Each of the energy systems need to be targeted in different ways if weight training is to be successful:

**ATP/PC System** - When training the immediate energy system you have to make sure that:

- ☐ The training is more intense but the frequency is less (about 3 reps per set).
- ☐ Intensity should be maximal (about 95% of maximum).
- ☐ Muscles trained are specific to the muscles that used in performance.

**Anaerobic Lactic Acid System** - When training the anaerobic lactic acid system you have to make sure that:

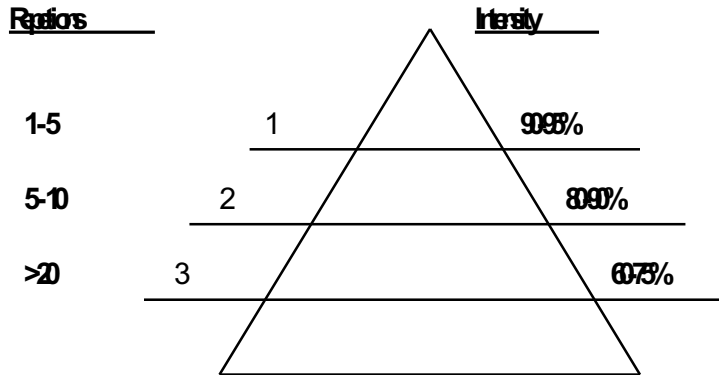
- ☐ You specifically overload the lactic acid system.
- ☐ You use specific muscles involved in competition.
- ☐ Intensity should be at about 85% of maximum.
- ☐ Frequency should be average (about 8 reps per set).

**Aerobic Energy System** - When training the aerobic energy system you have to make sure that:

- You train at a low intensity (about 65% of maximum).
- You train at a high frequency (above 20 reps).
- Be specific to competition but keep other areas of body good in this area also.

**Here is a diagram to sum up how to train specifically to these systems:**

The height represents the intensity of the exercise needed to improve the system. The width represents the frequency required to improve the energy systems.



1= ATP/PC System    2= Anaerobic Lactic Acid System    3= Aerobic Energy System

### **How Energy Systems Relate to my Targets:**

I have four main targets, which I feel can all be obtained through weight training. I will be looking at targeting two body systems in different parts of the body. These are the anaerobic lactic acid system in my legs and the ATP/PC System in my upper body. Improving these two systems should help achieve all four of my targets. I will go about improving these systems in the following way:

**Anaerobic Lactic Acid System** - From my last section we can see the basic ways in which we can improve the lactic acid system (second section of energy pyramid) ,but I need to apply them to the regime I will be doing:

- **Specific** - As this system is used in the legs of footballers I am going to be training my legs to this system.
- **Intensity** - As I need to overload the system gradually, I will be increasing the intensity as the weeks go on. I will change the intensity from 80% to 90% over 9 weeks moving up 5% every 3 weeks.
- **Frequency** - I will do 3 sets of 8 reps every week.

**ATP/PC System** - I will aim to improve my anaerobic ATP system (first section of energy pyramid) by doing the following:

- **Specific** -I feels that my upper body has a weak anaerobic ATP system as I don't have the power I need, therefore I will be targeting this system in my upper body.
- **Intensity** - As I need to overload this system, I will start at 90% for the first four weeks, then by the end of the four weeks I should be ready to move up to 95% for

the next five weeks.

- **Frequency** - I will do 3 sets of 3 reps every week, this is low because the intensity is so high.

### **Effects of training on these energy systems:**

Training each of these energy systems will have different effects on your body:

**ATP/PC System** - The effects of training will be:

- Improved Performance
- Marked muscular hypertrophy (enlargement).
- Increase in levels of key phosphagen stores.

**Anaerobic Lactic Acid System** - The effects of training will be:

- Improved performance.
- Greater muscle size.
- Greater levels of glycolytic and glycogenolytic enzymes.
- Increased lactate tolerance and or clearance from muscle.
- Less L.D.H (and so less lactic acid build up).
- Minimal fatigue.
- Your total work volume will increase.

**Aerobic Energy System** - The effects of training will be:

- Increased amount of mitochondria (where respiration takes place).
- Increased capacity for free fatty acid oxidation.
- Greater endurance capacity.
- Greater ability to use oxygen (VO<sub>2</sub> max).
- Additional Biochemical Adaptations to Aerobic Training.
- Increased Myoglobin.
- Greater insulin sensitivity.
- Greater glycolytic enzyme concentration.
- Increased capacity to use amino acids as fuel.

Now I have explained the different energy systems in the body I will go through the different exercises I will be doing and explain why I am doing so.

## **Breakdown of My PEP**

There will be a number of different exercises used in my pep, which I will now show and explain. I have found out my maximum weight for each exercise and I will show the weight that I will be lifting each week and how many repetitions and sets I will do for each exercise:

### **Machine Bench Press:**

**Technique** - Lie spine on bench with upper chest under lever bar. Feet flat on floor. Grip lever bar firmly with a wide oblique overhand grip. Press bar until arms are extended. Lower weight in controlled manner to upper chest. Inhale when lowering and exhale when pushing up. Repeat.

**Muscles used** - The main muscle that is targeted here is the pectorals major (pecs).



Other muscles that will aid the movement (synergists) and so will also improve are the deltoids, triceps and the biceps.

**Why these muscles** - As stated earlier on I want to improve my upper body strength and in doing bench press I will do this. I will try and improve my ATP/PC system for these muscles because I feel I need to be more powerful in my upper body.

**Maximum Weight** - 45 Kg

**Schedule** - Because I am concentrating on power I will work at a high intensity with a low frequency:

□ *First 4 weeks* - 3 reps, 3sets. 90% of max = 40.5 Kg

□ *Second 5 weeks* - 3 reps, 3sets. 95% of max = 43 Kg

### **Lateral Pulldown:**

**Technique** - Grasp cable bar with a wide grip. Sit with thighs under supports. Pull down cable bar to upper chest. Return in a controlled manner until arms and shoulders are fully extended. Exhale when pulling, inhale when returning. Repeat.

**Muscles used** - The target muscle here is the Latissimus Dorsi. The synergists are the biceps, forearms, deltoids, rhomboids, neck, trapezius and the triceps.

**Why these muscles** - Once again this exercise is to improve my upper body strength and power.

**Maximum Weight** - 50 Kg

**Schedule** - Because I am concentrating on power I will work at a high intensity with a low frequency:

□ *First 4 weeks* - 3 reps, 3sets. 90% of max = 45 Kg

□ *Second 5 weeks* - 3 reps, 3sets. 95% of max = 48 Kg

### **Lying Leg Curl:**

**Technique** - Facing bench, lie with stomach on bench with knees just beyond edge of bench and lower legs under lever pads. Raise lever pads to back of thighs by flexing knees. Lower lever pads in controlled manner until knees are straight. Inhale when raising exhale when lowering. Repeat.

**Muscles used** - The target muscles are the hamstrings. The synergists are the gastrocnemius (calves) and sartorius (thighs).

**Why these muscles** - These muscles are used a lot in football, from running after the ball to kicking it. Improving these muscles will improve performance in all areas of my physical game. I will work on my anaerobic lactic acid system in my legs, because as a midfielder I need to run for sustained periods on and off within a game and if I am to improve my game this energy system needs to be at peak performance.

**Maximum Weight** - 35 Kg

**Schedule** - Because I am working on my anaerobic acid system I will work at a lower intensity but a higher frequency:

- *First 3 weeks* - 8 reps, 3 sets. 80% of max = 28 Kg
- *Second 3 weeks* - 8 reps, 3 sets. 85% of max = 30 Kg
- *First 3 weeks* - 8 reps, 3 sets. 90% of max = 32 Kg

### **Sitting Leg Extension:**

**Technique** - Sit on bench with back against back support. Place shin/ front of ankle under padded lever. Position knee on the edge of the bench so that legs are just hanging over. Extend knees until leg are straight, lifting the weight. Return lever to original position in a controlled manner by bending knees. Inhale when lifting, exhale when lowering. Repeat.

**Muscles used** - The target muscle here is the quadriceps. There aren't really any synergist in action.

**Why these muscles** - In football the quadriceps are used when running with speed and is the main muscle when kicking. If you look at the basic movement of the exercise you can see that is a very simplified movement of what you do when you're kicking. I will once again concentrate on the anaerobic lactic acid system here as it is the most relevant to my position in football.

**Maximum Weight** - 65 Kg

**Schedule** - Because I am working on my anaerobic acid system I will work at a lower intensity but a higher frequency:

- *First 3 weeks* - 8 reps, 3 sets. 80% of max = 52 Kg
- *Second 3 weeks* - 8 reps, 3 sets. 85% of max = 56 Kg
- *First 3 weeks* - 8 reps, 3 sets. 90% of max = 59 Kg

### **Leg Press**

**Technique** - Sit on bench with back on support. Place feet on platform. Grasp handles to sides. Push platform away by extending knees and hips and so lift the weight. Return in controlled manner until hips are completely flexed. Exhale when pushing platform, inhale when returning. Repeat.

**Muscles used** - The target muscle is the quadriceps. The synergists are the gluteus maximus and the adductors. Although they aren't doing much work the hamstrings and the gastrocnemius are stabilizers.

**Why these muscles** - These muscles are again the most important muscles used in football and so I am going to exercise them. Also I will be concentrating on the anaerobic lactic acid system while I am doing this.

**Maximum Weight** - 141 Kg

**Schedule** - Because I am working on my anaerobic acid system I will work at a lower intensity but a higher frequency:

- *First 3 weeks* - 8 reps, 3 sets. 80% of max = 113 Kg
- *Second 3 weeks* - 8 reps, 3 sets. 85% of max = 120 Kg
- *First 3 weeks* - 8 reps, 3 sets. 90% of max = 127 Kg

### **Bicep Curl:**

**Technique** - Hold cable bar with a shoulder width under hand grip. Stand close to pulley. With the elbows to the side, raise the bar until forearms are vertical thus lifting the weight. Lower in a controlled manner until the arms are fully extended. Exhale when lifting, inhale when returning. Repeat.

**Muscles used** - The target muscle here is the biceps and the wrist flexors act as stabilizers.

**Why these muscles** - These muscles will help me hold up the ball and challenge for headers. This is because my upper body will be stronger and other players will find it harder to move me. I will focus on explosive power in these muscles because this will help me do improve in my target area.

**Maximum Weight** - 18 Kg

**Schedule** - Because I am concentrating on power I will work at a high intensity with a low frequency:

- *First 4 weeks* - 3 reps, 3sets. 90% of max = 16 Kg
- *Second 5 weeks* - 3 reps, 3sets. 95% of max = 17 Kg

### **Tricep Curl:**

**Technique** - Hold cable bar with a shoulder width over hand grip. Stand close to pulley. With the elbows to the side, lower the bar until arms are extended thus lifting the weight. Raise in a controlled manner until the forearm is close to upper arm. Exhale when lifting, inhale when returning. Repeat.

**Muscles used** - The target muscle here is the triceps and the wrist flexors act as stabilizers.

**Why these muscles** - These muscles will help me hold up the ball and challenge for headers. This is because my upper body will be stronger and other players will find it harder to move me. I will focus on explosive power in these muscles because this will help me do improve in my target area.

**Maximum Weight** - 23 Kg

**Schedule** - Because I am concentrating on power I will work at a high intensity with a low frequency:

- *First 4 weeks* - 3 reps, 3sets. 90% of max = 21 Kg
- *Second 5 weeks* - 3 reps, 3sets. 95% of max = 22 Kg

### **Peck Deck:**

**Technique** - Sit in machine with back on pad. Place forearms on padded lever. Make sure upper arms are level. Push levers together. Return in controlled manner until arms are in starting position. Exhale when pushing, inhale when returning. Repeat.

**Muscles Used** - The target muscle here is the pectorals major and the synergists are the deltoids.

**Why these muscles** - This exercise will improve my upper body strength again and thus improving my game. I will target explosive power through the ATP/PC system.

**Maximum Weight** - 20 Kg

**Schedule** - Because I am concentrating on power I will work at a high intensity with a low frequency:

- *First 4 weeks* - 3 reps, 3sets. 90% of max = 18 Kg
- *Second 5 weeks* - 3 reps, 3sets. 95% of max = 19 Kg

### **Squats:**

**Technique** - Squat down placing shoulders under pads. Place feet shoulder width apart directly under shoulders. Keep head forward, back straight and feet flat on the floor. Extend knees and hips until legs are straight, thus lifting the weight. Descend until thighs are just past parallel to floor. Exhale when extending, inhale when descending. Return and repeat.

**Muscles used** - Once again the target is the quadriceps. The synergist are the gluteus maximus and the adductors, while the stabilizers are the hamstrings, gastrocnemius and abdominals.

**Why these muscles** - This will improve all the major leg muscles used in football improving all round fitness and specific fitness in the sport. I will target the anaerobic lactic acid system.

**Maximum Weight** - 45 Kg

**Schedule** - Because I am working on my anaerobic acid system I will work at a lower intensity but a higher frequency:

- *First 3 weeks* - 8 reps, 3 sets. 80% of max = 36 Kg
- *Second 3 weeks* - 8 reps, 3 sets. 85% of max = 39 Kg
- *First 3 weeks* - 8 reps, 3 sets. 90% of max = 41 Kg

### **Calf Raise:**

**Technique** - Place shoulders under pads. Position toes and balls of feet on calf block with arches and heels extending off. Grasp sides of padded lever. Extending hips and knees, keep knees straight throughout exercise. Raise heels by extending ankles as high as possible. Lower heels by bending ankles until calves are stretched. Inhale when lowering, exhale when raising. Repeat.

**Muscles Used** - The target muscle here is the gastrocnemius, with the trapezius being the stabilizers.

**Why these muscles** - The calves will be used a lot when running and jumping in football and so improving these will help me improve performance. I will concentrate on the anaerobic lactic acid system in these muscles.

**Maximum Weight** - 80 Kg

**Schedule** - Because I am working on my anaerobic acid system I will work at a lower intensity but a higher frequency:

- *First 3 weeks* - 8 reps, 3 sets. 80% of max = 64 Kg
- *Second 3 weeks* - 8 reps, 3 sets. 85% of max = 68 Kg
- *First 3 weeks* - 8 reps, 3 sets. 90% of max = 72 Kg