

**DESIGN CONSIDERATIONS AND ANALYSIS  
OF THE IN-SEASON STRENGTH PROGRAM  
FOR A DIVISION II MEN'S BASKETBALL  
TEAM**

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## **INTRODUCTION**

Strength training has become an important aspect of many collegiate sports programs. Research has shown that year-round strength programs can be beneficial to many sports, including basketball (8, 25). The purposes of such training are varied and depend on the sport and the time of year. This analysis will discuss the design considerations and evaluate the effectiveness of an in-season strength-training program for a NCAA Division II men's basketball team. The evaluation will determine how effective the program was at meeting the in-season objectives of maintaining strength; increasing power, speed, and quickness; maintaining endurance; and reducing the incidence of injury.

## **PROGRAM DESIGN AND RATIONALE**

The program was designed in accordance with three basic principles of strength training: progression, overload, and specificity (1). A needs analysis was also conducted to identify any additional objectives necessary for the program. This needs analysis consisted of interviewing the head coach to determine his goals for the team, an analysis of the sport to determine the physiological traits necessary for success, and an analysis of the players to determine any specific adaptations or areas to focus on for improvement.

### **Needs Analysis**

The three aspects of the needs analysis revealed similar results. The head coach wanted the athletes to be strong, quick, be able to jump high, and have good aerobic endurance. A specific sports analysis revealed that basketball players be moderately strong, be powerful, have quick, explosive burst of speed, and endurance to repeat these burst of speed throughout the course of the game (7, 16, 27). The athlete analysis revealed the additional information that most of the players needed to increase flexibility and improve stability to help reduce the possible incidence of injury. Because this program was conducted during the competition season, it was deemed that any necessary aerobic conditioning would occur during the normal course of practice and that no additional aerobic conditioning was needed (11).

### **Progression**

In the traditional strength training progression model, training volume is decreased as training intensity is increased until the time of the major competition (1). However, a basketball season contains many major competitions and thus the traditional model did not seem appropriate. Instead, a nontraditional progression model, the use of which has been highly debated, was used to accommodate this circumstance (2). The nontraditional model has also been referred to as a non-linear model because of the undulation of intensity, but most strength and conditioning specialists believe that all progression models are in a sense non-linear (24). Therefore, because this program's progression did not follow the traditional linear approach it was considered nontraditional.

The major difference between the traditional progression model and the nontraditional model is the adjustments to intensity throughout the microcycles. In the

traditional model, intensity is maintained or steadily increased throughout the microcycle. However, in the nontraditional approach, intensity is decreased at times to provide “light” work-outs. Proponents of this model believe that the variations in intensity help prevent overtraining, especially during the long mesocycle of a basketball season (1). Several studies have looked at the effect of intensity variations and throughout a training cycle and have found that the nontraditional model does allow for maintenance of strength and improvements in power without overtraining (15, 20, 23).

During the early in-season (Mesocycle 2), resistance training was limited to two sessions per week or microcycle. All sessions utilized lower volumes than the previous mesocycle and intensity was adjusted between the two sessions in each microcycle. The first session consisted of higher intensities (85% of 1RM, or 100% of 4-5RM), while the second session consisted of lower intensities (70% of 1RM, or 100% of 8-10RM). The session order was designed so that the highest intensity work-outs would occur early in the microcycle after at least 4 days of rest. Graph 1 in the appendix displays the progression of volume and intensity for Mesocycle 2.

During conference competition (Mesocycle 3), resistance training was limited to one or two sessions per week, depending on the game schedule. Volume was steadily decreased during this mesocycle, while intensity continued to undulate. Unlike Mesocycle 2, where sessions alternated between relatively high and low intensity, intensity varied according to the proximity to a competition during Mesocycle 3. Graph 1 in the appendix displays the progression of volume and intensity for Mesocycle 3.

### **Overload**

The overload principle of resistance training involves increasing the load throughout the mesocycle (1). Other methods such as increasing training sessions per microcycle, adding exercises, or decreasing rest periods can also be used to overload the training. In this program, overload was accomplished by increasing the load lifted (% 1RM) in each session. As previously described, the load or intensity was not steadily increased throughout the mesocycle. Instead, the load decreased during the second training session of each microcycle in Mesocycle 2. However, the load was steadily increased from each high intensity session. In order to try to achieve the set objectives of maintaining strength and increasing power, strength exercises were limited to no more than 8 repetitions, while power exercises were limited to 4 repetitions in Mesocycle 2. During Mesocycle 3, strength exercises were further decreased to approximately 3-5 repetitions, and power exercises were decreased to 3-4 repetitions. These repetition ranges have been shown to achieve maximal results while keeping volume low (6, 22).

### **Specificity**

Specificity and exercise selection are extremely important components of a strength-training program. Based on the needs analysis, specific exercises for increasing lower extremity power and speed as well as whole body strength exercises were deemed necessary for this sport. In addition, exercises that required movement in all three planes of motion were also incorporated. Standard Olympic lifts and variations of these lifts were used to help improve power and quickness, while many standard, whole-body exercises were included in order to maintain strength and hypertrophy. The final aspect to consider was stabilization exercises to help reduce the incidence of injury. Exercises

to improve stability involved using only one limb at a time, or involved lifts using an unstable base. Table 1 in the appendix lists the various exercises used according to their specific function.

### **Other Considerations**

Many other factors are also involved in designing a strength program, such as training status of the athlete, exercise order, rest periods, and availability of training equipment. All athletes participated in a five week mesocycle (Mesocycle 1) designed to: 1) introduce the various exercises; 2) teach proper technique; 3) familiarize the athletes with the program design; and 4) build base strength and muscular adaptations. Exercise order was carefully considered and all training sessions began with a power exercise paired with another multi-joint, non-power, strength exercise. Because power exercises require the highest level of skill and concentration, they were placed early in the session when the athletes were not physically or mentally fatigued. Single-joint, supplementary exercises were generally placed at the end of the session, or paired with a multi-joint exercise that primarily involved the antagonist muscles. Exercises were paired to allow adequate rest periods between sets, but provide for maximum efficiency of time. Availability of training equipment could have been a problem during the implementation of the program. However, this potential setback was overcome by assigning athletes to work-out groups that performed different exercises each session, but with the same specificity. More on the implementation of the program will be discussed in the Program Implementation section.

## **ASSESSMENTS AND RATIONALE**

### **Power**

In order to evaluate the effectiveness of the program, several assessments were conducted following the completion of Mesocycle 1 and Mesocycle 3. The various assessments were selected to measure muscular power, strength, speed, quickness, and endurance. A vertical jump test and the Texas Power Bike were used to measure power. The vertical jump assessment involved using a Vertec device where each athlete performed three jump techniques. Athletes' standing reach heights were determined and athletes performed a two-foot countermovement jump, a drag-step countermovement jump, and a full run-up jump. Only three attempts were allowed per technique and the highest value was recorded. Results from the two-foot countermovement jump were used to calculate peak power based on an equation developed by D.L. Johnson where peak power =  $78.47 \times \text{vertical jump height (cm)} + 60.57 \times \text{mass (kg)} - 15.31 \times \text{height (cm)} - 1308$  (13). Athletes were also tested for power using the University of Texas Power Bike. After a five minute warm-up and procedure familiarization period, athletes performed four trials on the bike with the highest power output recorded. Due to time and equipment availability, athletes were only tested on one day after Mesocycle 1, and therefore any learning effect that might result in higher power outputs was not considered (17). However, athletes were only tested on one day at the completion of the program and hopefully the lack of learning effect would be the same for each testing session.

## **Strength**

The supine barbell bench press was used to assess muscular strength primarily because of the ease of conducting the test. Although the bench press is not the most sport-specific strength test for basketball, it is a reliable assessment for upper-body strength. Evaluation standards have also been established for the bench press and thus it was included in the test battery. All athletes were also familiar with the test and it provided a safer strength assessment than the back squat or an Olympic lift. All athletes performed two warm-up sets of approximately ten and five repetitions respectively. Following a three minute rest, the strength coach loaded the barbell with an amount of weight that was deemed appropriate for the athlete. The weight selection was based on previous training weight and was chosen in order to fatigue the athlete in less than eight repetitions. This protocol has been used in predicting 1RM and has been shown to be reliable and valid (3). Table 2 in the appendix displays the conversion method used in determining 1RM from reps-to-fatigue.

## **Speed and Quickness**

Speed and quickness assessments involved various sprints and a quickness/agility drill. Full court and half-court sprint tests were utilized as well as a T-Test quickness assessment. After athletes were adequately warmed-up and stretched, each athlete performed two half-court timed sprints followed by two full-court timed sprints. Both times were recorded and averaged. Following the full-court sprint it was noticed that the confined lay-out of the court provided a minimal amount of stopping distance. For safety concerns it was decided that the full-court sprint was not a safe or adequate assessment and was not used in post-testing. Athletes also performed a T-Test for quickness and agility. The T-Test requires the athlete to sprint ten meters to a cone, laterally shuffle left five meters to a cone, laterally shuffle right ten meters to a cone, laterally shuffle left five meter to the first cone, and finally backpedal ten meters to the start line. All athletes must touch the base of the cones and cannot cross their feet when laterally shuffling. Two attempts were allowed and the times from each attempt were averaged. Diagram 1 in the appendix displays the design of the T-Test.

## **Endurance**

Endurance was assessed through the use of a 300 meter shuttle run. Athletes were required to run from the baseline to the opposite free-throw line and back six times (a distance of approximately 300 meters). After a one minute rest period, the athletes were required to perform the test again. Both shuttle runs were timed and averaged. In order to encourage the athletes to continue to give a high level of performance, the head coach suggested that all athletes needed to match or better their first shuttle run time or they would have to perform another test. Although many athletes did not match their first shuttle run time, the threat did help ensure that all athletes continued to give a high level of performance.

Athletes performed the strength and power assessments on one day and the speed, quickness, and endurance assessments on a second day. Athletes were divided into two with one group starting with the strength assessment and the other group starting with the vertical jump assessment. Power as assessed by the Texas Power Bike was conducted on

a separate day. During the speed, quickness and endurance assessments, all athletes performed the half-court sprint first, followed by the T-Test, and finally the 300-meter shuttle run. All assessments were performed during their regularly scheduled work-out sessions by the same coach in order to provide tester reliability. In order to assess the incidence of injuries, an injury log was kept for each athlete that recorded any injury and whether it limited participation or not. Due to illness, injury, or other circumstance, not all athletes were able to participate in all of the assessments, and therefore some data is limited.

## **PROGRAM IMPLEMENTATION**

The overall macrocycle consisted of five mesocycles. Mesocycle 1 was the pre-season mesocycle and included five microcycles of 1 week in length. Mesocycles 2 and 3 were the in-season mesocycles and included five microcycles in each mesocycle. Each microcycle in Mesocycle 2 contained two work-out sessions that were performed on Monday and Wednesday. Work-out days varied during Mesocycle 3, but most sessions were performed on Monday and the day before a game (usually Wednesday). Each sessions began with a warm-up specifically designed to prepare the athletes for training. Warm-ups varied each session, but included an agility based warm-up, a dynamic flexibility warm-up, or a skip warm-up. Following every session, athletes performed partner assisted PNF stretching to help improve flexibility and potentially diminish muscle soreness (12).

During Mesocycle 2 the athletes worked out as a team, which usually involved 12 to 15 athletes. Due to limited training equipment, athletes were assigned to groups of three or four and performed a specific work-out. Each group performed a different work-out designed to provide the same exercise type (i.e. power, multi-joint strength, etc.), but requiring different equipment. For the first three microcycles of Mesocycle 2, each group rotated work-outs until all groups had performed all six work-outs. For example, group 1 performed Work-out 1 on Monday and Work-out 2 on Wednesday during the first microcycle, then Work-outs 3 and 4 during the second microcycle, and finally Work-outs 5 and 6 during the third microcycle. Group 2 would start with Work-outs 3 and 4 and rotate in the same manner, while group 3 would start with Work-outs 5 and 6 during the first microcycle. By the end of the third microcycle, all athletes had performed the same six work-outs. The final two microcycles of Mesocycle 2 involved four separate work-outs that were only performed once. Once again, each work-out was designed to provide the same types of exercises, but involving different equipment.

Following Mesocycle 2 was an unexpected four week break. This included a week off for fall semester finals, a week off to return home, and a two week road trip to Florida. During this time no supervised work-out sessions were provided, however, athletes were encouraged to work-out on their own. It was because of this unplanned break that Mesocycle 3 began with a relatively higher volume, but lower intensity than previously planned. This change was made to allow the athletes to ease back into training with minimal soreness and muscle fatigue. The possible ramifications of this break will be discussed in the Program Analysis.

Unlike Mesocycle 2 where most sessions were conducted as a team, many sessions during Mesocycle 3 were conducted in small groups. This allowed for many of

the work-outs to be the same for all athletes. It was also during this mesocycle that many athletes missed work-outs due to scheduling conflicts or injury. Access to the facilities was also limited due to other sports beginning their conditioning programs. These factors made adherence to the program difficult and may have limited the effectiveness of the program. In a few instances, some athletes performed work-outs in addition to the scheduled sessions. Although encouraged not to work-out extra on their own, some athletes did and this resulted in overtraining in at least two athletes. Because this mesocycle also coincided with the conference portion of the season, some weeks only consisted of one work-out session. Therefore, some microcycles had two high intensity work-outs without a low intensity break. Nonetheless, a low intensity work-out was administered for each session that preceded a competition or followed an intense practice. Table 3 in the appendix displays all the work-outs for Mesocycles 1-3.

## **RESULTS AND ANALYSIS**

Statistical analysis using a paired sample t-test of the pre-season and post-season assessments showed statistically significant changes in many areas. Vertical jump heights significantly improved for all jump techniques. The two-foot jump increased by 1.6 inches from a pre-season mean of 25.0 inches to a post-season mean of 26.6 inches indicating a 6.4% increase. Peak power as determined using the two-foot countermovement jump also significantly increased from a pre-season mean of 6237 watts to a post-season mean of 6502 watts indicating a 4.2% increase. The drag-step jump increased 1.6 inches from a pre-season mean of 26.6 inches to a post-season mean of 28.2 inches indicating a 6.0% increase. The full run-up vertical increased 1.7 inches from a pre-season mean of 32.1 inches to a post-season mean of 33.8 inches indicating a 5.3% increase. Power as assessed by the power bike changed, but the differences were not statistically significant. Strength significantly decreased among the athletes from a pre-season mean of 244.2 lbs to a post-season mean of 234.2 lbs, although two athletes slightly improving. This decrease in strength indicated a 4.1% decline. Sprint and T-Test times decreased slightly as well, indicating possible improvements, but were not significant. Run times for the 300 meter shuttle decreased significantly as well from a pre-season mean of 61.54 sec to a post-season mean of 60.65 sec indicating a 1.4% improvement. Body weight decreased among most athletes with four athletes gaining weight, however, the change was not significant. Although injuries did occur, most resulted from acute trauma, and few athletes missed games because of chronic injuries. Flexibility, although not directly measured, also seemed to increase in most athletes by the end of the season. The results from this program differ from other studies. However, these differences could be attributed to different training protocols, study populations, and different testing methods (4, 5, 9, 14, 19). Table 4 in the appendix displays the results from both testing sessions.

### **Power**

Although vertical jump did increase, many athletes lost body weight, which might indicate that power did not change. However, estimations of peak power during the second assessment indicate that although athletes lost body weight, vertical jump power still increased. Although some studies indicate that vertical jump power is better

estimated using a non-countermovement jump, that technique did not seem appropriate for the sport of basketball and was therefore not used (21). Another possibility for the changes observed in vertical jump could be that the athletes were slightly overtrained or overreaching during the first assessment session. The athletes had just completed a rigorous mesocycle and could have possibly not been at their full potential. This seems unlikely as at the second assessment, the athletes were at the end of a highly competitive season and could have been equally fatigued. It seems most likely that the improvements in vertical jump were a result of the combination of Olympic lifting and the high amount of jumping involved during practice and games (10, 18, 26).

One athlete not involved in the training program also demonstrated an improvement in vertical jump. There are several possible explanations for this improvement: 1) The athlete possessed extremely poor flexibility in his shoulder during the first assessment. Although his standing reach height did not change, improvements in shoulder flexibility might have enabled him to reach higher while jumping. 2) The athlete lost 5lbs of body weight, which might have allowed him to jump higher without improving power. 3) The high volume of jumping performed during practice may have been enough of a stimulus to increase vertical jump. Unfortunately, this athlete did not participate in the power assessment using the Texas Power Bike and therefore a separate indication of power changes was not available.

Power as assessed by the Texas Power Bike increased in some athletes and decreased in others, with the overall changes not being statistically significant. Unfortunately, several factors made it difficult to analyze this data. First, only six athletes were assessed in both testing sessions. This was a result of one athlete being injured for the post-season testing, and only seven athletes reporting for the first testing session. Limited time and availability of equipment contributed to the lack of data. Second, the few athletes that were tested only performed four trials on one test day. It has been demonstrated that the power bike has a significant learning effect, and that results can vary from one testing session to the next (17). These two aspects made interpretation and analysis of this data difficult.

### **Strength**

Overall strength was not maintained throughout the program as indicated by the significant decreases in bench press performance. Although this was contradictory to the objectives of the program, it was not deemed as a major failure. Most of the athletes entered the program with moderate to high levels of upper body strength (1). The minor decreases in strength were probably a result of a shift from strength training to an emphasis on Olympic lifts and peak power in Mesocycle 3. While most athletes did decrease, they continued to demonstrate adequate levels of upper body strength for basketball. The one athlete who possessed a low level of upper body strength actually improved his strength. However, he was relatively untrained and his improvements in strength could be attributed to neurological adaptations rather than muscular changes (6).

### **Speed and Quickness**

Sprint and T-Test times both decreased for the athletes. However, these decreases were very not statistically significant and could be attributed to many factors. Although the same coach conducted both assessments, timing error could easily account for the

changes in sprint times. Another possibility could be a learning effect for the T-Test, or the possibility of overtraining prior to the first assessment. Nonetheless, sprint performance and quickness and agility remained fairly constant throughout the season. This indicated that the program was adequate in maintaining speed and quickness.

### **Endurance**

Endurance shuttle times also decreased, with the changes being statistically significant as well. Throughout Mesocycles 2 and 3, the athletes participated in continuous running for periods of 30-60 seconds. This was a result of normal situations that occurred during practice and games and may have contributed to the improvements or maintenance of the 300 meter shuttle times. Although the program was not designed to address the need for endurance, the needs analysis indicated that it was an important component and therefore it was included in the assessment battery. These results indicate that normal practice and game conditions are adequate for maintaining or improving endurance.

### **Injuries**

It is impossible to determine whether or not the strength-training program prevented any injuries, but only two athletes suffered significant injuries that prevented them from participating in competition. One athlete torn his anterior cruciate ligament (ACL) and medial meniscus during a non-contact drill in practice. The injury required surgery to repair and the athlete missed the remainder of the season. Another athlete landed poorly on his wrist after a foul and missed one game because of a possible wrist fracture. Further examination revealed no fracture and the athlete was cleared to play. Several athletes complained of joint soreness and stiffness, but none required absence from participation. It is difficult to determine if the soreness was caused by the strength-training or by the high volume of practice, but no athletes missed more than two work-out sessions in a row because of injury. The athletic training staff examined all injuries and appropriate modifications were made to work-outs for certain athletes during certain microcycles.

Although the majority of the objectives for the program were met, several mistakes were also demonstrated. The most significant error was in the preparation for the semester break. The athletes went four weeks without supervised or scheduled work-outs which could have contributed to the decrease in strength. The athletes could have also been slightly overtrained following Mesocycle 1. Exercise technique errors, as well as performance errors, were both observed during the last microcycle of Mesocycle 1. This could have been the result of a too rapid increase in intensity without subsequent decreases in volume. Possible methods for improvement will be discussed in the next section.

## **PRACTICAL APPLICATION**

Results from the assessments only indicate changes in those areas tested. The most important aspect of any training program is whether or not it affected performance. A commonly used indicator of performance success has been win/loss record. An

examination of the win/loss for this team (4 wins & 23 losses) might indicate that the program was unsuccessful. However, several factors can contribute to win/loss record other than physical conditioning.

Although the team had a strength program during the previous season, this was the first instance when many of the athletes performed Olympic lifts. Most of the athletes were accustomed to performing high intensity strength exercises or high repetition multi-joint exercises. Therefore, it would be expected that most athletes would show some improvement in power simply because they were relatively untrained (with respect to power exercises) prior to the program. It would of interest to continue this program for several seasons and follow the progress of the freshman athletes over their entire career.

Equipment availability also came become a concern when implementing a strength program. At the beginning of Mesocycle 1, the resistance training equipment consisted of one squat rack, one power platform, Olympic bars and weights, a set of dumbbells from 10lbs to 45lbs, six medicine balls, and three plyometric boxes of varying heights. It required great effort and creativity to design a pre-season program to accommodate all the athletes and meet all objectives with limited facilities. As the macrocycle progressed, more equipment was provided and the work-out design was easier. Therefore, even with limited facilities and equipment, it is possible to design a program to improve strength, power, quickness, and speed.

As previously discussed, several aspects of the program could be adjusted in an attempt to improve the overall outcome. Better preparation for the semester break might allow for less of a decline in muscular strength. This could have been accomplished by providing individual work-outs involving exercises that the athletes could perform without supervision or equipment. Establishing exercise sessions while traveling could also have helped maintain adaptations and attenuate the affects of detraining. Avoidance of overtraining during Mesocycle 1 could have been accomplished by simply decreasing the volume as the intensity increases. Extending the length of Mesocycle 1 might also have helped avoid possible overtraining by allowing for a more gradual increase of intensity while still keeping the volume constant. Finally, stressing adherence to the protocol and better attendance could have also provided more data and insight into the effectiveness of the program. This responsibility ultimately lies with the coaching staff and their commitment to a strength-training program.

## **CONCLUSION**

Overall, the in-season strength-training program designed for the Division II men's basketball team met the initial objectives. Athletes showed improvements in power, maintained or slightly increased speed and quickness, and only two athletes suffered injuries that resulted in missed competitions. Although strength was not totally maintained, most athletes still retained 4.1% of their initial muscular strength. Overall flexibility also seemed to improve, but unfortunately was not measured. While several aspects of the program could be adjusted and improved, it seems from this short-term analysis that the program was adequately designed. Better adherence and attendance, as well as a longitudinal assessment might give a better indication of the effectiveness of the program.

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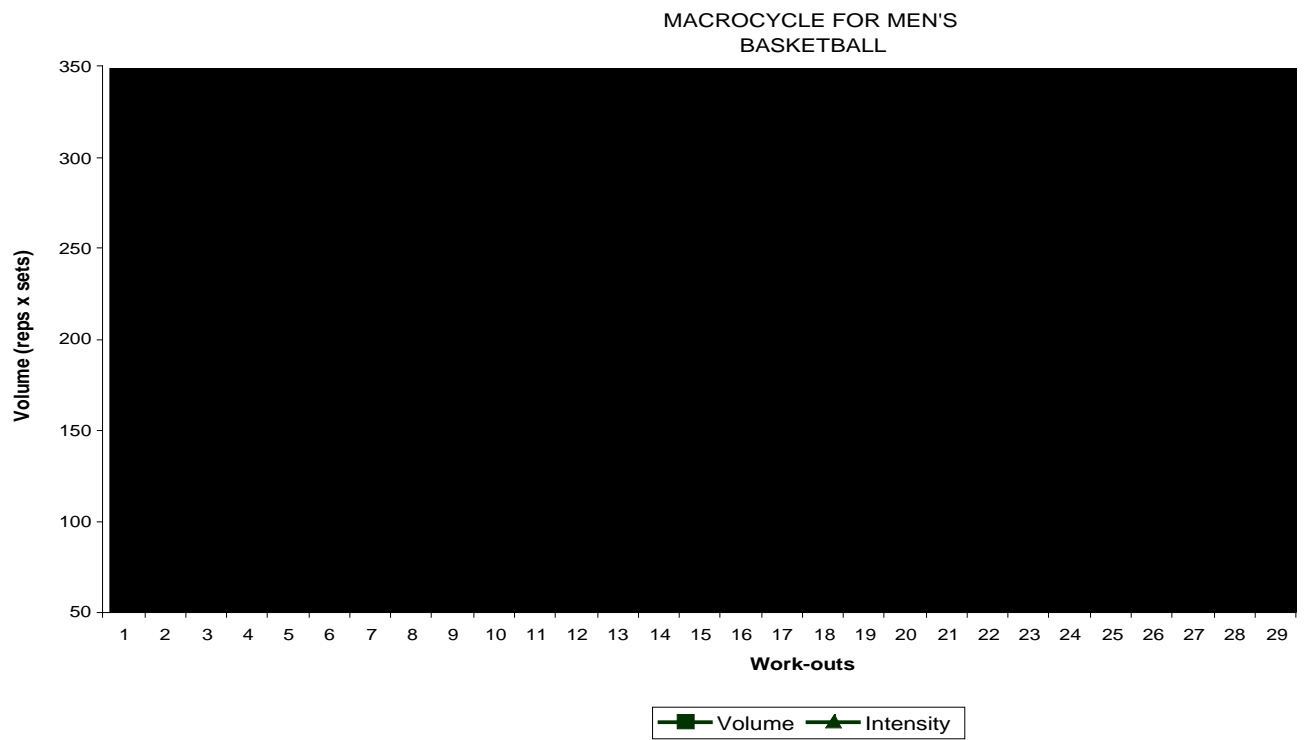
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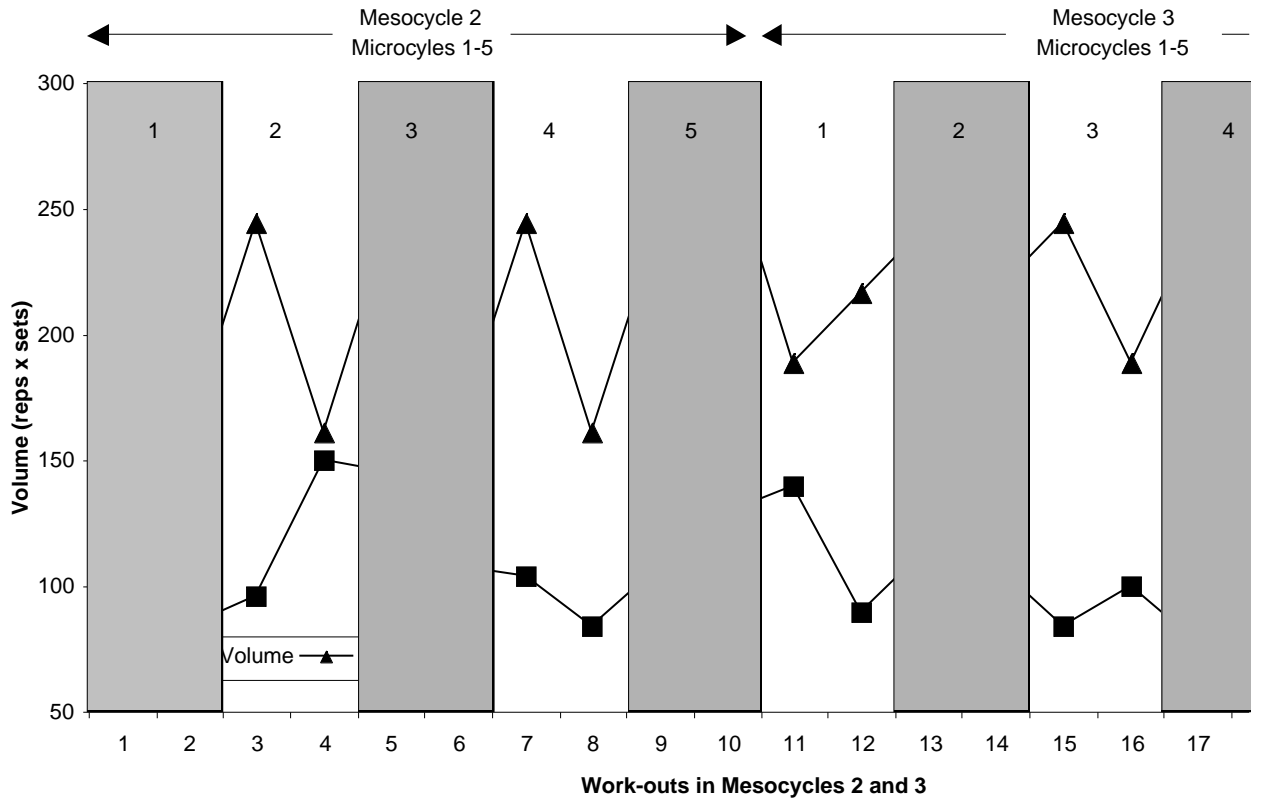
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**Graph 1a: Work-out Progression**



**Graph 1b: Microcycle Progression for Mesocycles 2 & 3**



**Table 1: List of Exercises by Type and Function**

## **Power**

- Snatch
  - 1-arm dumbbell snatch
  - 2 dumbbell snatch
- Push Press
  - 1-arm dumbbell push press
- Power Clean
  - Clean and Jerk
  - 1-arm dumbbell power clean
  - High pulls

## **Strength**

- Bench Press
  - Incline
  - Dumbbells
  - Box push-ups
  - Close-grip
- Squat
  - Back
  - Front
  - 1-leg pitcher
  - Dumbbells
  - Staggered stance w/ dumbbells
- Step-ups
  - Dumbbell
  - High box
- Lunges
  - Low box
  - Front
  - Lateral
  - Back
- Shoulder Press
  - Dumbbells

## **Supplementary Exercises**

- Hammer curls
- Inverted pull-ups
- Pull-ups
- Pulley rows
  - High
  - Low
  - 1-arm

## **Stability**

- Gastroc wheel
- 1-leg toe touches
- 1-arm medicine ball push-ups
- Pitcher squats
- Low box lunge
- High box step-ups

## **Core**

- Core pulls
- Box bridges
- Iron cross
- Trunk curl-up
- Pillar of strength
- Single leg bucs
- Trunk rolls
- Medicine ball overhead slaps
- Medicine ball windmill
- Medicine ball rotation
- Medicine ball side throws
- Medicine ball rotation
- Incline sit-ups
- Dumbbell woodchop

## **Plyometric**

- Medicine ball chest pass
- Medicine ball overhead pass
- Static box jumps
- Box jumps
- Overhead medicine ball hops

- Dips
- Dumbbell Deadlift
- Upright rows
- Lat pulldowns
- Dumbbell Straightleg Deadlift

**Table 2: Estimation of 1RM**

<b>Repetitions</b>	<b>Percentage of Max</b>
1	100
2	90.04
3	87.73
4	85.83
5	84.03
6	82.32
7	80.71
8	79.19
9	77.74
10	76.38
11	75.08
12	73.86

example: 225 for 6 reps would be  $225 / .82324 = 273$

From Brzycki, M. Strength testing: Predicting a one-rep max from reps-to-fatigue. *JOHPERD*. 64: pp. 88-90, 1993.

**TABLE 3**  
**ALL WORK-OUT**

## St. Edwards Men's Basketball Work-out-Mesocycle 1

Monday- Ladder Warm-up		Wednesday-Skip Warm-up		Friday-Dynamic Flexibility		
Snatch	5	1-arm Drop Step Snatch to Squat to Press	5	2 DB Snatch to Box Step-ups	5--10	Quickfoot Ladder scissor hops skip icky shuffle
	5		5		5--10	
	5		5		5--10	
	5		5		5--10	
Med Ball Chest/ Outlet Pass	10	Box Push-ups	12	1-arm Med ball push-ups	10	cross-over 2 in lateral 1 in lateral 1-2 lateral
	10		12		10	
	10		12		10	
	10		12		10	
Gastroc stretch 3 position	5	Heavy Jump Rope	30 sec	Pitcher Squats	5	reverse icky reverse crossover sagittal hops
	5		30 sec		5	
	5	Hamstring stretch			5	
Core pulls 15 sec				Med Ball Overhead	20	frontal hops frog hops
		Pull-ups	10	Hops	20	
Lateral Lunge to Press	8		10			
	8		10			
	8		10			
	8		10			
Low pulley row	10	DB Lunge Matrix (5 positions)	1	DB Rotation Press	10	Skip A B power up & out crossover lateral lat. Cross drop back
	10		1		10	
	10		1		10	
	10	Supercat	10	10		
1-leg toe touches	10		10		10	
	10			DB wood chop	10	

	10	<b>Hammer Curl to Press</b>	8		10	carioke
<b>Reaching Hamstring Stretch</b>			8		10	
			8		10	<b>Flexibility</b>
<b>DB Front Squat</b>	8		8	<b>Hi Box Psoas stretch</b>		caulky walk
	8	<b>DB Bench Press</b>	10			heel walk
	8		10	<b>High pulley row</b>	8	ankling
	8		10		8	lunge w/ elbow dov
<b>Static Box Jumps</b>	10	<b>1 arm staggered stance low row</b>	8		8	lunge w/ twist
	10		8		8	lateral lunge
	10		8	<b>Front Squat to Push Press</b>	6	low/slow carioke
<b>Staggered stance squat to press</b>	4		8		6	ankle to butt
	4				6	ankle to hip
	4	<b>Pillar of strength w/ alt leg lifts</b>	30 sec	<b>Box Jumps</b>	10	belly down V up
	4		30 sec		10	hip rotator lying
		<b>Single leg bucks</b>	10		10	
<b>Box bridges</b>	10		10			
	10	<b>Trunk rolls</b>	10	<b>Med ball overhead slaps</b>	20 sec	
<b>Iron cross</b>	10		10		20 sec	
	10			<b>Med ball windmill</b>	10	
<b>Trunk curl-up</b>	15				10	
	15					

## St. Edwards Men's Basketball Work-out-Mesocycle 1

Monday- Ladder Warm-up		Wednesday-Skip Warm-up		Friday-Dynamic Flexibility		
Snatch	5	1-arm Drop Step Snatch to Squat to Press	5	2 DB Snatch to Box Step-ups	5--10	Quickfoot Ladder scissor hops skip icky shuffle
	5		5		5--10	
	5		5		5--10	
	5		5		5--10	
Med Ball Chest/ Outlet Pass	10	Box Push-ups	12	1-arm Med ball push-ups	10	cross-over 2 in lateral 1 in lateral 1-2 lateral
	10		12		10	
	10		12		10	
	10		12		10	
Gastroc stretch 3 position	5	Heavy Jump Rope	30 sec	Pitcher Squats	5	reverse icky reverse crossover sagittal hops
	5		30 sec		5	
	5	Hamstring stretch			5	
Core pulls 15 sec				Med Ball Overhead	20	frontal hops
		Pull-ups	10	Hops	20	frog hops
Lateral Lunge to Press	8		10			
	8	10	DB Rotation Press	10	Skip A B power up & out crossover lateral lat. Cross drop back	
	8	10		10		
	Base pulley row	10	DB Lunge Matrix (5 positions)	1		10
10		1		Low box lateral lunge		10
10		1			10	
10		DB High pull to	5	10		
1-leg toe touches	10	speed squat	5	10		
	10	box step-ups	5	DB wood chop	10	

	10		5		10	carioke
<b>Reaching Hamstring Stretch</b>					10	
					10	
					10	<b>Flexibility</b>
<b>DB Front Squat</b>	8	<b>Hammer Curl</b>	8	<b>Hi Box Psoas stretch</b>		caulky walk
	8	<b>to Press</b>	8			heel walk
	8		8	<b>High pulley</b>	8	ankling
	8	<b>DB Bench Press</b>	10	<b>row</b>	8	lunge w/ elbow dov
<b>Static Box Jumps</b>	10		10		8	lunge w/ twist
	10		10		8	lateral lunge
	10	<b>1 arm staggered</b>	8	<b>Front Squat to</b>	6	low/slow carioke
<b>Staggered</b>	4	<b>stance low row</b>	8	<b>Push Press</b>	6	ankle to butt
<b>stance squat to</b>	4		8		6	ankle to hip
<b>press</b>	4		8	<b>Box</b>	10	belly down V up
	4			<b>Jumps</b>	10	hip rotator lying
		<b>Pillar of strength</b>	30 sec		10	
<b>Box bridges</b>	10	<b>w/ alt leg lifts</b>	30 sec			
	10	<b>Single leg bucks</b>	10	<b>Med ball</b>	20 sec	
<b>Iron cross</b>	10		10	<b>overhead slaps</b>	20 sec	
	10	<b>Trunk rolls</b>	10	<b>Med ball windmill</b>	10	
<b>Trunk curl-up</b>	15		10		10	

**TABLE 4a: ASSESSMENT RESULTS**  
**MEN'S**  
**BASKET**  
**BALL**  
**STRENGTH**  
**TESTING**

Name	Date	Body Wt (lbs)	Height (in.)	TX Power Bike (watts)	Reach	2-foot	Drag-step	Run-up	Peak	Bench	F
					(in.)	Vertical (in.)	Vertical (in.)	Vertical (in.)	Power Vertical (watts)	reps @ wt	pre (
Jermaine Phillips	10/13	160	70.0		93.0	28.5	31.0	35.0	6055	8 * 185	:
	2/20	160	70.0		93.0	30.0	32.5	36.0	6354	6 * 185	:
		0				1.5	1.5	1.0	299		
Brad Burdick	10/13	230	71.5		94.0	26.5	27.5	31.5	7526	9 * 275	:
	2/20	225	71.5		94.0	28.0	29.0	34.0	7687	4 * 295	:
		-5				1.5	1.5	2.5	161		
Cyrus Russell	10/13	206	74.0	1439	100.0	22.5	24.0	28.0	5970	8 * 225	:
	2/20	200	74.0	1440	100.0	23.5	25.0	28.5	6005	1 * 245	:
		-6		1		1.0	1.0	0.5	35		
Lawrence Ramsey	10/13	195	78.5	1376	100.0	27.5	29.5	33.0	6489	7 * 185	:
	2/20	195	78.5	1388						5 * 185	:
		0		12							
Delrick Brown	10/13	225	75.5		98.0	27.5	29.0	33.0	7432	11 * 225	:
	2/20	215	75.5		98.0	30.5	31.0		7754	10 * 225	:
		-10				3.0	2.0		322		
Brian Burton	10/13	165	70.0		94.0	26.0	26.0	31.0	5695	5 * 165	:
	2/20	170	70.0							6 * 155	:
		5									
Dustin Mikes	10/13	225	75.0	100.0	23.0	25.0	30.5	6554	11 * 185	:	
	2/20	220	75.0	100.0	24.0	26.5	32.0	6616	3 * 225	:	
		-5			1.0	1.5	1.5	62			
Terrance	10/13	190	73.5		100.0	28.5	29.5	38.0	6745	9 * 225	:

Thomas	2/20	193	73.5		100.0	30.5	31.0	38.0	7226	10 * 225	:
		3				2.0	1.5	0.0	481		
James	10/13	188	79.0	1425	102.0	21.0	21.0	27.0	4981	7 * 155	
Gaskin	2/20	195	79.0	1422	102.0	24.0	24.0	29.0	5497	1 * 185	
		7		-3		3.0	3.0	2.0	516		
David	10/13	243	74.5		100.0	27.0	29.5	33.0	7867	11 * 225	:
Graves	2/20	230	74.5							8 * 225	:
		-13									
Mark	10/13	215	76.0	1740	101.0	26.5	28.0	33.5	6938	6 * 205	:
Klemm	2/20	222	76.0	1770	101.0	28.0	30.0	36.5	7429	injured	in
		7		30		1.5	2.0	3.0	491	injured	in
Brice	10/13	190	79.0	1328	102.0	20.5	23.0	30.5	4937	3 * 165	
Reid	2/20	183	79.0	1310	102.0	21.0	24.0		4844	4 * 140	
		-7		-18		0.5	1.0		-93		
Eddie	10/13	185	80.0	1346	105.0	26.0	28.5	35.0	5857	4 * 135	
Lanier	2/20	185	80.0	1360	105.0	25.5	27.5	35.5	5757	4 * 150	
		0		14		-0.5	-1.0	0.5	-100		
Geoffrey	10/13	175	74.0		99.0	25.0	26.0	30.5	5615	10 * 165	:
James	2/20	180	74.0		99.0	28.0	29.5	34.5	6315	6 * 180	:
		5				3.0	3.5	4.0	700		

<b>Average</b>											
<b>Team Change</b>	<b>-1</b>		<b>6</b>		<b>1.6</b>	<b>1.6</b>	<b>1.7</b>	<b>261.3</b>			

**Table 4b: Statistical Analysis of Assessments**

	<b>Pre-season means</b>	<b>Post-season means</b>
Body weight (lbs) n=14	199.4	197.4
2 ft Vertical (in) n=11	25.0	26.6*
Drag-step Vertical (in) n=11	26.6	28.2*
Full Run Vertical (in) n=9	32.1	33.8*
Peak Power on Vertical (watts) n=11	6237	6502*
Bench Press (lbs) n=13	244.2	234.2**
1/2 Court sprint (sec) n=9	2.42	2.35
T-Test (sec) n=9	10.60	10.48
300 Shuttle (sec) n=10	61.54	60.65**
Power Bike (watts) n=6	1442	1448

\*indicates a significant increase from the pre-season assessment

\* indicates a significant increase from the pre-season assessment,  $p < 0.05$

\*\* indicates a significant decrease from the pre-season assessment,  $p < 0.05$