



PRACTICAL NUTRITION FOR RUGBY

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Providing coaches, referees, players, and administrators with the knowledge, skills, and leadership abilities to ensure that safety and best practice principles are incorporated into all aspects of contact rugby.

INTRODUCTION

The best food choices may not make a champion out of a rugby player with no talent, but an inadequate diet can certainly prevent a talented player from reaching optimal training and performance levels. Nutrition plays a vital role throughout training, as well as before, during and after matches. The diet needs to be structured and periodised to support the physical demands of training and matches, by providing appropriate amounts of the necessary nutrients at the right times.

Typical nutrition challenges faced by rugby players include achieving body composition goals for specific positions of play; meeting additional energy (carbohydrate and protein) demands; organising a practical and economical nutrition plan while juggling work or study and training commitments; and keeping to a nutrition programme whilst traveling with the team, and/or making appropriate adjustments in a very limited off season, and/or when injured. The following section will discuss some of the practical issues about food, supplements and drugs that rugby players may encounter. Throughout the discussion branded food products are used as examples. It should be noted that these are merely examples and are certainly not an endorsement of these products in particular.

CARBOHYDRATES, PROTEIN AND FATS

Carbohydrates, protein and fats are the three primary energy-containing nutrients found in food. For optimal performance and adaptations to training, the amount and timing of each of these nutrients needs to be manipulated. Thus, a basic understanding of each of these nutrients is necessary to plan meals. See Table 1.

FLUID

Fluid plays a significant role in optimising rugby performance. Fluid is important to maintain adequate hydration and can also be a practical source of nutrients such as carbohydrate (and protein if needed) and electrolytes. By increasing the production of saliva, which has anti-microbial properties, fluid may impact on immune function (fighting infection). Research shows that athletes who do not drink anything during exercise will perform less well than they would if they drank ad libitum (according to thirst). If players are more than 2% dehydrated and thirsty in warm to hot conditions, performance will be impaired. Fluids can also be an important and practical source of carbohydrate for a rugby player.

An important role of fluid is to regulate body temperature and prevent heat illness that may result if the rate of heat production by the body exceeds the rate of heat loss, and total body temperature rises to a level that leads to organ dysfunction and collapse.

There are several factors that may contribute to the risk of developing heat illness and it should be noted that drinking will not prevent heat stroke, as there are many other contributing external and internal factors. External factors include ambient temperature; radiant heat (direct sunlight); humidity; wind; exposure time; clothing (e.g. dark clothing), headgear, shoulder pads, and medication, as well as stimulants such as pseudoephedrine and caffeine. Internal factors include a past history of heat intolerance; body size and composition; aerobic fitness; acclimatisation; pre- and during- exercise hydration levels; and viral illness, e.g. upper respiratory tract or gastroenteritis.

It is therefore recommended that players are closely monitored and individually assessed on a daily basis, when exercising in a hot environment. Any player demonstrating signs or symptoms of heat stress should be removed immediately from training or playing.

SIGNS AND SYMPTOMS

Early signs of dehydration are headache, fatigue, loss of appetite, flushed skin, heat intolerance, light headedness, dry mouth and eyes, and dark urine with a strong odour. Advanced signs require urgent medical intervention and include difficulty in swallowing, clumsiness, shrivelled skin, sunken eyes and dim vision, painful urination, numb skin, muscle spasms, “abnormal behaviour”, and delirium.

Note that there is the risk of players over-drinking and this in itself may have risks. For example, it has been reported that American football players, in an attempt to prevent heat cramps, over-hydrated by drinking too much water. Signs of over-hydration include: nausea, vomiting, extreme fatigue, respiratory distress, dizziness, confusion, disorientation, oedema (rings, shoes, watches may feel tight), coma, seizures, and even death if left untreated.

HOW MUCH FLUID BEFORE AND DURING?

Rugby is a team sport played by athletes of varying stature where the game is of an intermittent nature and limited to two 40-minute halves. The intermittent nature of the sport probably allows for greater access to fluid intake during competition when compared with endurance events.

- As a rough guide, drink between 500-800ml per hour if you are a 70-90kg player. Heavier players may require more, and in hot or humid weather conditions all players should drink more.
- Body weight can be used as a general guideline and to encourage an increased awareness of individual fluid requirements. Players should be weighed before and after exercise in minimal clothing, and corrected for urine losses and drink volume.

- More is not better – drink according to guidelines and caution not to over-interpret these recommendations or be overenthusiastic. Fluid should also be provided at meal/snack times to encourage players to drink.
- Fluid absorption is best if the stomach is kept partially filled during exercise. This can be achieved by drinking 250-500ml immediately before players run on to the rugby field and then adding an extra 100ml every 10 minutes (or as close to that as possible) during the match – providing approximately 600ml per hour.

HOW MUCH FLUID AFTER TRAINING OR A MATCH?

- After exercise, players continue to lose fluid by sweating or urinating, so they need to replace fluids and drink at regular intervals. Remember that carbohydrate-containing drinks will also help minimise any muscle damage and will restore muscle energy stores more rapidly. A small amount of protein should be included. Players should avoid alcohol in the recovery period as alcohol encourages further fluid losses.
- Using the calculated difference between pre- and post- body weights can also be used to give an indication of how much fluid is needed for rehydration. A general guideline of a volume equal to 150% of the fluid deficit is often recommended when players only have 2-4 hrs post-training to fully rehydrate. Otherwise players will make up these deficits by eating and drinking regularly.

TYPE OF FLUID?

Carbohydrate should be included in the drink at a concentration of 5-8% and the drink should contain a small amount of sodium (salt). More sodium is required in hotter conditions and these requirements can be met by commercial oral rehydration powders and/or by adding extra salt to food and salty snacks. Sports drinks and sports drink powders (at the recommended concentration) that can be mixed with water are therefore the ideal choice. Water is not the ideal drink during a match or when training.

TIPS TO ENCOURAGE BETTER FLUID PRACTICES AND REDUCE THE RISK OF HEAT STRESS

- Take personally labelled drinks to practices
- Players must familiarise themselves with their own fluid requirements in different environmental conditions – in hotter and more humid conditions they may need to drink more
- Include fluid breaks when training
- Ensure drinks are cool as they taste better than warm drinks
- Encourage flavours that are enjoyed, as players will then tend to drink more

- Cooling strategies are very important to prevent heatstroke in hot conditions. These include staying in the shade during breaks and removing warm jerseys; using cold-water ice packs and side-line fans, etc.

Allowing athletes to acclimatise to hot conditions for 7-10 days should also be a component of managing potential heat illness.

ALCOHOL

In team sports, the culture may often promote post-game alcohol binges. Alcohol reduces reaction time, and impairs balance, accuracy, hand-eye co-ordination, strength, power and endurance, and impairs body temperature regulation. Alcohol also increases high-risk behaviour that may lead to poor judgement and reduced inhibition, accidents, injuries and even death. Alcohol also distracts from sound recovery strategies, injury treatment and sleep. Drinking alcohol after a match interferes with the recovery of the body's carbohydrate stores, and acts as a diuretic, thereby increasing urinary fluid losses and so delaying rehydration. Alcohol also has a vasodilatory effect, which can increase bleeding and swelling, thus delaying or slowing recovery of soft-tissue damage and rehabilitation from injury. (Refer to Injury and Rehabilitation).

With an energy density of 29kJ (7kcal)/gram, alcohol can contribute significantly to daily energy intake, causing fat gain. Alcohol may also lead to increased storage of dietary fat, as it is a preferred fuel and so suppresses the oxidation of fat, which is then stored.

PRACTICAL TIPS

1. Adhere to the 24-hour rule, i.e. - avoid alcohol in the 24 hours before a match and in the 24 hours after a match, if any soft tissue injuries or bruising have occurred. Some teams may have a ban on alcohol intake!
2. Ensure that plenty of non-alcoholic drinks are available after training or a match. Those players who choose to drink alcohol should ensure that they are adequately rehydrated and refueled with carbohydrates and fluid before drinking alcoholic drinks which in any case should be limited.
3. Note that although some alcoholic beverages do contain carbohydrate (e.g. beer) the alcohol content of the drink is a diuretic and inhibits the restoration of glycogen in the muscles. This affects performance and recovery therefore players should rather resort to other more appropriate sources of carbohydrate (Refer to Carbohydrate).

MICRONUTRIENTS

As with the energy-supplying nutrients (carbohydrate, protein and fat), the micronutrients (i.e. vitamins and minerals) are best consumed via a well-planned, energy-sufficient, varied and complete diet. There are some situations where vitamin and mineral supplements may be needed, e.g. when players consume a low-energy diet, are traveling, have impaired immune function, or are following a vegetarian regime. It is widely accepted that vitamin and mineral deficiencies will impair performance but there is no evidence to show that supplementing an already adequate diet in vitamins and minerals will enhance performance. In fact, it may have negative consequences, especially if taken in mega-doses. (Refer to Supplements)

Practical tips to ensure good dietary intake of vitamins/minerals:

- enjoy a variety of fruit and vegetables
- aim for 5-9 portions of fruit and vegetables/day
- where possible, choose fresh produce, especially those in season
- frozen vegetables, if cooked correctly, are also nutritious
- limit storage time
- avoid overcooking
- limit the amount of water used
- do not add bicarbonate of soda to green vegetables
- make use of fortified cereals

NUTRITION FOR DIFFERENT TRAINING GOALS

It is very important to have a clear understanding of the goals for changes in body composition for each player. For example, some rugby players may just need to lose body fat, others just increase muscle mass, while some need to achieve both of these. These goals, like training, need to be periodised as not to negatively impact on performance. It is not recommended to increase muscle mass and decrease body fat at the same time as increasing muscle mass demands more energy whereas losing body fat requires a reduction in energy. Similarly, large reductions in body fat are best avoided during competitive seasons and should be restricted to off-season training. It would also be counter-productive to use creatine when trying to lose fat mass. Regular monitoring of body composition is important to determine whether the eating plan and training regimen are supporting the goals of the player concerned.

INCREASED MUSCLE MASS

- Most players have a desire to increase muscle mass and strength. A gain in muscle mass requires the combination of a well-designed resistance training programme, together with a well planned diet. Ideally, the resistance training programme designed to induce muscle hypertrophy should occur early pre-season, when the training volume and thus lower energy demands are lower
- Realistic expectation: 0.25-0.50 kg increase in body mass per week. If rates are higher, this is likely to include an increase in body fat stores that may have to be reduced at a later stage.
- As resistance training influences protein metabolism for up to 48 hours following training, players need to continue to eat high protein/high energy meals throughout the week, and not only on training days.
- The most important dietary component of a weight-gain programme is an increase in total energy intake (additional 2100 kJ or 500 kcal per day). This can be a challenge when the demands of training and other commitments may limit opportunities to eat. Intense training may also suppress appetite after training.

TIPS

- Increase the number of meals and snacks throughout the day. This is going to mean planning ahead to ensure that good options are available.
 - Make use of energy-dense drinks, and foods that are not high in fat, e.g. sports drinks, fruit juices, smoothies, liquid meal replacements, bars, dried fruit, soft drinks.
 - Reduce foods that may be limiting appetite and volume. This may mean replacing some wholegrain foods with lower fibre alternatives and ensuring that all drinks contribute energy (replace diet drinks and large volumes of water with sports drinks, juices or low-fat dairy drinks).
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- Protein requirements are increased. Generally these needs are met through increasing total energy unless the player has limited access to protein-rich foods (meat, fish or chicken, dairy products, eggs, legumes and soya products).
 - Timing of protein intake is very important. Besides including protein at meals, it needs to be consumed together with carbohydrate-rich recovery snacks after training to enhance anabolic processes. Examples include low-fat fruit yoghurt, smoothies, cereal with milk, biltong and fruit. (Refer to Recovery)

- Note that current research does not support extreme protein intakes as this displaces other essential nutrients, can be a source of fat, is costly, and will merely lead to fat mass gain.

DECREASED FAT MASS

- Reasonable goal – lose 0.25-0.5.0 kg/week of body fat
- May need to manipulate training programme (e.g. the inclusion of higher-intensity training dependant on the individual player's time, injury risk and propensity for overuse of certain muscle groups).
- The approach needs to be holistic. Players needing to lose body fat may require behaviour modification and psychological support.
- When training volume decreases (e.g. over holiday periods or if the player is injured), total energy intake needs to be reduced to avoid fat mass gain.

TIPS

- Reduce energy intake by avoiding foods that are high in calories/kilojoules but low in nutrients, e.g. sports drinks, alcohol, high-fat snacks.
- Lower fat intake: use low-fat cooking methods, don't double up on spreads, and give preference to unsaturated fats.
- Increase dietary fibre intake, choosing foods that are wholegrain or whole wheat to add bulk. High-fibre foods generally have a low Glycaemic Index (GI) and are more slowly absorbed from the blood, allowing for sustained blood sugar levels and making one less hungry.
- Include a low-fat/lean protein-rich food at each meal to increase satiety (feeling of fullness).
- Between-meal snacks may need to be limited to recovery times and should always include some protein (see Recovery).
- Portion control and label-reading needs to be encouraged.
- The temptation to use supplements and/or drugs for weight loss needs to be strongly discouraged as they may be unsafe and/or may contain banned substances.
- Players should avoid fad diets and weight cycling (yo-yo dieting).

IMPROVED RECOVERY

Recovery nutrition strategies are important, not only after matches but also when training day-to-day. The goals of recovery nutrition are to: replenish muscle and liver glycogen stores; replace fluid and

electrolytes lost in sweat; and regenerate and repair damaged tissue. There is a window period after exercise when the rate of glycogen synthesis is optimal.

- Players should consume 1.0 -1.5g high glycemic index (GI) carbohydrate/kg body weight (eg. A sports drink) within 30-40 minutes after exercise and at frequent intervals until the next meal.
- Small, frequent meals and compact forms of carbohydrate such as fluids (also beneficial for hydration) and sugar-rich sports supplements are better tolerated.
- Adding a small amount of protein will stimulate carbohydrate storage and result in faster repair and recovery of muscles as well as synthesis of new protein. This is important if players lack appetite or have short recovery.
- A team approach to recovery is often helpful where the team/management organises suitable snacks and drinks. Players should otherwise be encouraged to take food and drinks along to training.
- Alcohol should be avoided in the post-recovery period.

EXAMPLES OF POST-EXERCISE RECOVERY SNACKS THAT PROVIDE ~50G OF CARBOHYDRATE + 10-20G HIGH-QUALITY PROTEIN (I.E. PROVIDE ESSENTIAL AMINO ACIDS).

- 250-350 ml carbohydrate energy drink + 250 ml liquid meal supplement (e.g. Nestlé Nutren Activ)
- 200-300 ml fruit smoothie/milkshake
- 250 ml low-fat fruit yoghurt or 350 ml drinking yoghurt
- 200 ml drinking yoghurt + low-fat energy bar
- Small handful of lean biltong + low-fat energy bar (e.g. Fast Fuel, Power Bar or Safari fruit bar)
- Sandwich with low-fat cheese/cottage cheese/lean cold meat/chicken + 1 fruit
- Bowl of cereal with low-fat/fat-free milk
- 10 slices (45x15x3 mm) lean biltong (30g) + 10 Super C's or 10 jelly babies + water
- 2 small packets pretzels + 250 ml low-fat yoghurt
- 340ml Amarhewu + 3tsp peanut butter
- 60g Morvite powder mixed into a smooth drink
- 2 cups Smash with 2 tablespoons skim milk powder
- 2 sachets B-immune Energy Drink
- 750 ml sports drink + maas/yoghurt/cheese/biltong
- 750 ml Sports drink with 1 sachet Peptopro

MATCH NUTRITION

Players need to focus on nutrition on both the day of the match as well as the week before the match. Adhering to eating plans during the training week will ensure adequate carbohydrate stores during the game. In the last 24-36 hours, when training may be tapered prior to a match, it is especially important to increase carbohydrate, keeping fat intake low. This means that, as far as possible, players should plan ahead and be prepared for all situations, especially when traveling or staying in hotels, which might test their discipline.

PRACTICAL TIPS

- Players should never try anything new on a match day – all dietary strategies should have been well rehearsed.
- Use this opportunity to restore liver glycogen stores and also to hydrate.
- Choose foods and drinks that do not cause any gastro-intestinal discomfort and that will stave off hunger pangs. If any player experiences reactive hypoglycemia and/or abdominal discomfort during a match, they should have a longer time between the last snack and the match.
- Eat a main meal at least 3 hours prior to kick-off, focusing on carbohydrate-rich foods with a small amount of protein. This meal is an important opportunity to add to the body's glycogen stores and should be light and easy to digest. Avoid very high protein and fat intake as too much fat will make players feel uncomfortable and will not provide necessary energy. Too much fibre may also cause gastro-intestinal discomfort. Players who lack appetite or are nervous should opt for a liquid meal replacement.

EXAMPLES OF PRE-MATCH MAIN MEALS

Breakfast ideas for morning games:

Fruit/fruit salad/fruit juices and low-fat yoghurt and cereal
Porridge and low-fat milk
Muffins/crumpets/pancakes/toast with jam and low-fat cheese
Boiled eggs and toast with jam/honey/Marmite

Lunches:

Spaghetti or other noodles with lean mince and/or vegetable or tomato-based topping (no cream)
Chicken a-la-King and rice, and peas/carrots
Grilled chicken breast with mashed potato/sweet potato or stir-fry rice
Baked potato with tuna or chicken or vegetable-based topping
Extra bread, fruit and fruit salads and low-fat yoghurt/low fat desserts can be included with this meal, plus sports drinks

PRE-MATCH TOP-UP

1 hour before kick-off: top up fuel stores with a small snack.

EXAMPLES OF PRE-MATCH TOP-UP SNACKS

Sandwiches with low-fat cheese/ham/chicken/boiled egg/tuna/jam and peanut butter
Muffins or pancakes or crumpets with honey/syrup or sugar and cinnamon
Fresh fruit and low-fat yoghurt
Fruit smoothies
Sports bars or cereal/breakfast bars and sports drinks
If lacking appetite or unable to tolerate solid food, a liquid meal replacement (e.g. Ensure/Nestlé Nutren Activ) is an alternative option.

Since fluid may not be readily available for when players may be thirsty during a match, it seems prudent to advise that immediately before the game begins players drink about 250-500ml fluid, as this primes the stomach and assists with fluid emptying.

During the match, fluid intake is important to prevent dehydration. Players should use every opportunity to quench thirst during the match, i.e. during stoppages, injury time and halftime. They need to familiarise themselves with their fluid requirements in different environmental conditions. It is beneficial to

incorporate carbohydrate into the fluid as this has many benefits towards the end of the match – delayed onset of fatigue, better maintenance of skills and concentrations – ideally 30-60 g per hour. The effects of consuming fluid and carbohydrate are additive. A variety of options exist for carbohydrate intake, however sports drinks offer a convenient strategy for meeting fluid and carbohydrate needs simultaneously. Fluid should not be forgotten if consuming gels, bars or solid food.

Post-match recovery nutrition strategies are essential. See **Recovery**.

SHOPPING

The following shopping tips will help players put their eating plan into practice. Even if they are not responsible for shopping or cooking, they can share these tips with whoever is involved with the preparation of meals.

PRACTICAL TIPS:

Plan meals for the week ahead of time and use this strategy to compile a shopping list containing all the necessary ingredients. To create interest and variety, include different carbohydrates (e.g. rice, potato, pasta) and proteins (e.g. meat, chicken, eggs, fish and legumes), vegetables and fruit.

BEST CHOICES

- Low-fat (2%) or fat-free (skim) dairy products
- Proteins with less than 10 g fat/100g
- Carbohydrates with less than 5 g fat/serving
- Snacks that provide less than 6 g fat/50 g carbohydrate
- Fresh fruit and vegetables

LABEL LINGO

- Ingredients on food packages are listed in descending order by weight. If fat (lard, butter, vegetable oil, hydrogenated or palm kernel oil, vegetable oil, cream, coconut milk, etc.) appear high up on the list, there is a good chance that the product is high in fat.
- Cholesterol-free does not mean fat-free. Cholesterol is only found in animal products.
- “Health” products for example may be free from preservatives and additives but they may still be high in fat and “Light” does not always mean low-calorie/fat and appropriate for weight loss.
- When comparing products, make sure that like serving sizes are being compared and relate this to the quantity that would be eaten.
- Note the ‘best before’ or ‘use by’ dates.

- The energy content of food may be expressed as calories (kcal) or kilojoules (kJ). To convert from kcal to kJ, multiply by 4.2.

To save time and effort, players should keep a stock of certain basic food items and top up with fresh produce (dairy products, breads, vegetables, fruit and, if necessary, meats) 1-2x per week. There are many convenient long-life products on the shelves, some of which may be useful if players are in a boarding house or residence.

FREEZER LIST

Skinless chicken, crumbed chicken breasts (to be baked) and chicken sausage
Lean beef, ostrich, lamb or pork fillets, cubes or strips or minced
Frozen vegetables and stir fry mixes
Frozen fish pieces (e.g. hake)
Bread, rolls, pita breads, raisin buns/bread
Pizza bases
Muffins, crumpets, pancakes
Grated low fat cheese (e.g. Mozzarella)
Oven-baked chips
Low-fat frozen yoghurt (5% fat) and ice lollies

FRIDGE LIST

Fresh fruit and vegetables and juices
Reduced-fat cheese (11 – 22%)
Low-fat yoghurt and milk
Buttermilk (low-fat) and maas
Low-fat custard
Eggs
Margarine, butter, low-oil mayonnaise
Lean cold meat and chicken and turkey
Convenient pre-cut vegetables for soup or mixes (may reduce wastage)

FOOD CUPBOARD

Pasta, quick-cooking noodles, rice, samp, couscous
Oats, mealie meal, Morvite porridge, Mabella, breakfast cereals
Brumpet /crumpet /pancake mixes
Canned and dried legumes (kidney beans, baked beans, lentils, chickpeas)
Cream-style sweetcorn
Canned tomato and tomato/onion mixes
Canned non-cream tomato and vegetable soups
Canned fruit
Tinned fish (tuna, pilchards, sardines)
Soya mince (e.g. Toppers)
Long-life milk
Long-life custard or custard powder
Bottled pasta sauce e.g. tomato
Soy sauce
Vinegar
Dried herbs and spices
Sugar
Flour
Cocoa, Nesquik
Liquid meal replacements – Nestlé Nutren Activ and Ensure
Jams, honey, syrup, peanut butter, Marmite and fish paste
Spray 'n Cook
Skim milk powder
Jelly
Cordials (e.g. Oros, Clifton, Game)
Sports drinks
Oil

SNACK CUPBOARD

Cereal bars, sports bars, muesli bars
Oatso Easy, Pronutro, cereals
Quick noodles
Dried fruit
Provita/Ryvita and other low-fat crackers
Peanut butter, cheese spread, chocolate spread (use no butter)
Honey, jam, syrup
Tuna sachets, lean biltong
Cheese wedges – low fat
Tins of baked beans
Pretzels
Unbuttered popcorn
Plain sweet biscuits (e.g. Marie and Boudoir)

EATING OUT AND TAKE-AWAYS

Balancing training demands for rugby with other commitments may leave little time for shopping and food preparation. Eating out may therefore provide a much-needed break. By making careful choices with clever combinations, and sticking to recommended portion sizes, dietary goals can still be met.

PRACTICAL TIPS:

1. Many restaurants base their meals on protein-rich foods (meat, chicken, fish etc), with carbohydrate as an accompaniment. To boost carbohydrates, order extra side servings of carbohydrate-rich foods such as potato (not chips), steamed rice, noodles, and unbuttered bread/rolls and vegetables.
2. Limit fat intake: avoid menu items with the words – battered, fried, deep-fried, sautéed, creamy, creamed and crumbed. Rather choose dishes that are steamed, grilled, stir-fried, baked or poached. Remind waiters or waitresses that NO FAT means no oil, margarine, butter or cream.
3. Do not be misled by the word “healthy” – this does not necessarily mean low in fat. For example, salads may seem “healthy”, but may be high in fat if they contain avocado, cheese, seeds and croutons, which are high in fat. Dressings should be ordered on the side, or use Balsamic vinegar with only a dash of olive oil.
4. Avoid creamy sauces, gravies, dressings, butter, creamy foods and foods with lots of cheese (e.g. vegetarian). If ordering dressings or sauces, ask for them to be served separately to control

the amount. Combination dishes such as lasagne, casseroles and moussaka are often made with high-fat sauces, so rather order plain separate food items such as grilled fish or meat, baked potato and steamed rice and vegetables. Mint sauce, jelly, mustard, horseradish and apple sauce can be enjoyed with different meats.

5. For dessert, order fruit salad or a meringue/pavlova with frozen yoghurt, fruit mousse, plain sponge or a cappuccino.
6. If uncertain as to how a dish is prepared, ask for more information and be assertive.
See Table 2.

TRAVEL

While travelling there are many nutrition situations that are likely to present a challenge. These challenges include delays in transit; long-distance travel and jet-lag; hotel food; budget constraints; official functions (i.e. cocktail parties); and foreign menus with unusual food choices. It is best to work in conjunction with a dietitian with experience in sports nutrition to ensure stress-free and optimal food service.

FATIGUE

Dietary causes of fatigue in rugby include low energy and carbohydrate intake, as well as poor intake of fluid, vitamins, and minerals such as iron and zinc.

The high-intensity intermittent nature of rugby increases the need for carbohydrate. If carbohydrate stores (muscle glycogen) fail to keep pace with the energy demands of the game, muscles will fatigue early and players may experience mental confusion, dizziness and tiredness. Certain vitamins (especially the B vitamins) play an important role in both the production and release of energy from food. Fluid and minerals such as iron and zinc are also important in preventing fatigue.

Other dietary habits like crash dieting, excessive caffeine and/or alcohol intakes can also contribute to fatigue. Non-dietary factors such as lack of sleep, over-training and stress should also be considered.

PRACTICAL TIPS:

1. To boost carbohydrate and energy intake – refer to Carbohydrate.
2. To ensure adequate fluid intake – refer to Fluid.
3. To improve iron intake:
 - The best sources of iron are red meat including liver, ostrich, game, biltong and mopani worms, followed by dark chicken, white chicken and fish. Include these foods in the diet at least 5x per week.
 - When eating eggs, whole grains, lentils, soya and green leafy vegetables that do contain some iron, add a food rich in vitamin C because vitamin C increases the absorption of

the iron. Foods rich in vitamin C include tomatoes, oranges and lemons, guavas, strawberries, broccoli, and green peppers.

- Buy porridge and cereals that have been fortified with iron.
- Avoid drinking strong tea or coffee with meals since they decrease iron absorption.
- Remember that an iron supplement will not correct other nutritional deficiencies and can be toxic. Only take iron supplements on diagnosis of an iron deficiency and then only on the advice of a sports physician or sports dietitian.

4. To improve vitamin intake:

- Enjoy eating a good range of fruit and vegetables – the more colour the better. Aim for an intake of between 5-9 fruits and vegetables per day.
- Boost fruit and vegetable intake by making smoothies, adding them to pizza and bread toppings and to soups and stews.
- Where possible choose fresh produce, especially those in season.
- Frozen vegetables are also a nutritious choice.
- Use little water when cooking vegetables and avoid overcooking.

INJURY AND REHABILITATION

There is always a risk of getting injured when playing rugby. This may result in players missing out on training and matches for weeks or months and may also have many other consequences, which, if not addressed, can lead to a recurrent cycle of injury.

Nutrition during this time is absolutely critical to promote speedy recovery. Precise nutritional considerations will vary depending on the type of injury as well the individual situation. However, a change in energy expenditure is common to all injuries and this is exaggerated if players are unable to train for long periods of time. Gaining fat mass and losing much-needed muscle mass makes rehabilitation more problematic. The additional fat gain places an extra load on the injured body part once training is resumed, placing players at more risk for further injury. Thus, central to rehabilitation is the avoidance of muscle mass loss and fat mass gain, which requires a combination of a modified eating plan and a rehabilitation training programme.

PRACTICAL TIPS:

1. **To reduce the risk of injury when training or playing a match:**

Ensure that adequate carbohydrate and fluid (e.g. a sports drink) is consumed to avoid fatigue during training/playing a match. Immediately after training or the match, have a recovery snack/drink to replenish muscle energy stores which helps repair of any muscle damage (**see Match nutrition and Recovery.**)

Avoid alcohol immediately after a match and if injured no alcohol should be consumed for 24-48 hours as it delays recovery by causing extra swelling and bleeding.

Note that inappropriate creatine use may cause an unnecessary load on the muscles of growing players, increasing the risk of injury.

2. **To reduce unwanted fat mass gain and prevent loss of muscle mass when injured**

Energy in should not exceed energy out. This means cutting back on total food intake, especially concentrated sources of calories from foods that are typically used when training (e.g. sports drinks, bars, recovery snacks). Avoid eating out of boredom and resorting to high-fat comfort foods such as crisps, chocolates, cakes, etc.

The diet should focus on nutritious, low-fat foods such as low-fat dairy and lean meats (good sources of protein), fresh fruit and vegetables and high-fibre cereals and breads – all these foods are good sources of either protein, calcium, iron or vitamin C, which are essential in promoting healing.

3. **To promote general healing and recovery:**

Ensure an adequate intake of vitamins C and E, which are anti-oxidants and help the healing processes. Good food sources of these nutrients are fruits and vegetables (especially the citrus variety), seeds and vegetable oils. Sufficient dietary iron (lean meats) and calcium (low-fat dairy) are also important. If a short-term anti-oxidant supplement or immune booster supplement is required, this should be prescribed by the sports physician or dietitian.

4. **To reduce inflammation:**

There is currently no convincing evidence that glucosamine sulphate and chondroitin sulphate can reduce joint pain or boost recovery from a strenuous workout. However, if there is existing cartilage damage, there may be some benefit. Note that several supplements are combined with herbals and may be risky (**see Supplements**). Note that medications to reduce inflammation should be taken with meals to prevent gastric upsets.

5. **Head, neck and jaw injuries:**

If chewing or swallowing of foods is difficult, special meal replacements and special foods may be needed but this should be calculated and prescribed by a sports dietitian.

6. **If mobility is limited:**

If immobilised, in plaster or on crutches, players may not be able to shop for food or cook. In order to stick to their nutrition programme, careful planning and the help from friends or family will be needed.

NUTRITIONAL SUPPLEMENTS

Supplements are appealing to rugby players striving to improve performance and gain a competitive edge, and players are therefore an easy target for sport supplement companies. However, this industry is poorly regulated and as a result these companies make promises that are, in most cases, unsubstantiated. Despite this, there is an exponential growth in this market with new products finding their way onto the shelves. Furthermore, there is a real risk of supplements not containing the promised active ingredients or inadvertently containing harmful or illegal substances that may result in a doping offence.

Nutritional supplements include vitamins, minerals, protein and carbohydrate powders, fat-cutting remedies, sports bars and drinks/powders, to more specialised products such as amino acids, creatine, HMB and glutamine, either on their own or in combination with other ingredients. Some of these supplements may have a small but important performance-enhancing, or ergogenic effects. However, it is important to note that the benefits of supplements need to be kept in context with other performance-enhancing factors (i.e. basic nutrition, genetics, sleep, rest, mental attitude, training, equipment, etc).

Some supplements may also have a practical role (e.g. players who lack appetite, have high energy requirements and need to gain weight, or for players who are injured or are prone to infection). Note: in all cases supplements should only be prescribed by a sports dietitian or a sports physician and only once it has been determined that the habitual diet is unable to meet these additional requirements.

Rugby players need to be aware that they are liable and responsible for any and all substances appearing in their urine and blood and should they test positive for any banned substances their career may be ruined. Even supplements thought to be safe, may carry the risk of being contaminated with banned substances, since there is no proper regulation of the supplement industry worldwide.

SARU have thus compiled a POLICY DOCUMENT ON SUPPLEMENTS that is updated on a regular basis and the onus is on the player and supporting staff to stay informed at all times.

See Table 3. Practical Supplement Guide.

DRUGS

Ignorance of the issues surrounding drugs in rugby may not be used as an excuse by players, coaches, trainers, selectors, managers, agents, team staff, officials, referees, doctors, physiotherapists, dietitians or any other persons participating in, or involved in the organisation, administration, promotion or coaching of sport – and the consequences of the World Anti-Doping Agency (WADA) anti-doping rules apply.

Coaches have an enormous influence on the attitudes and actions of their players, and therefore have a responsibility to use their influence wisely. They need to take a stand on doping and must educate themselves and their players about anti-doping regulations, as well the dangers and penalties of using banned substances.

GOVERNING BODIES

The World Anti-Doping Agency (WADA) is an independent, non-governmental organisation created through the collective initiative led by the International Olympic Committee, following the Lausanne Declaration on Doping in Sport (1999).

WADA's purpose is to:

- protect the athlete's right to participate in doping-free sport and thus promote health, fairness and equality for athletes worldwide; and
- ensure harmonised, co-ordinated and effective anti-doping programmes at international and national level with regard to detection, deterrence and prevention of doping.

WHAT IS DOPING?

Doping is defined as “the presence of a prohibited substance in an athlete's bodily specimen, or the use or evidence of the use of any substance or method that has the potential to enhance sports performance and which either poses an unnecessary risk of harm to athletes, or is otherwise contrary to the spirit of the sport”.

It is important to note that there are also other anti-doping rule violations, which include:

- Refusing or failing to be available to submit sample collection
- Failure to provide information about whereabouts and missed tests
- Tampering, or attempting to tamper with, any part of doping control
- Trafficking in any prohibited substances or prohibited method.

THE ROLES AND RESPONSIBILITIES OF PLAYERS

- Be knowledgeable of, and comply with, all applicable anti-doping policies and rules
- Be available for sample collection
- Take responsibility, in the context of anti-doping, for what is ingested and used
- Inform medical personnel of their obligation not to use prohibited substances and prohibited methods and take responsibility to make sure that any medical treatment received, including dietary supplements, does not violate anti-doping policies and rules.

THE ROLES AND RESPONSIBILITIES OF PLAYER SUPPORT PERSONNEL

- Be knowledgeable of, and comply with, all anti-doping policies and rules applicable to them or the athletes to whom they support;
- Co-operate with the Doping Control Programme
- Use their influence on player values and behaviour to foster anti-doping attitudes.
- They need to be aware of the signs and signals that denote actual or potential steroid abuse.
- Some signs to look for which may indicate doping:
 - Abnormally heavy bouts of training
 - Sudden increase in body mass and strength in an abnormally short period
 - The player is in remarkably good shape despite an undisciplined lifestyle and little interest in diet and correct training
 - Increased injury frequency, particularly in the muscular attachment points and tendons
 - The player shows a keen interest in health foods and nutritional supplements and has an extensive knowledge of the effect of various medicines and doping agents.

SOME OF THE PROHIBITED SUBSTANCES AND THEIR SIDE-EFFECTS

Stimulants

Examples: Cocaine, amphetamines, ephedrine

Stimulants can be found in prescription and over-the-counter medications, as well as in herbal and nutritional supplements, and enable the body to perform above its fitness level for relatively long periods. However, this can lead to injury to muscle, bone and soft tissue and put the heart under strain.

Stimulants act on the central nervous system, speeding up parts of the brain and body, increasing alertness and decreasing perceived levels of fatigue. Some stimulants suppress the appetite and are used in an attempt to reduce weight.

Side effects: Headaches, dizziness, nausea, palpitations, cramps, restlessness, problems with co-ordination and balance, irritability, confusion, aggression, clinical depression, eating disorders, psychosis, paranoia, compulsive behaviour, addiction. Another dangerous side-effect that may occur is an extremely fast pulse rate, which can cause cardiac arrest. In very hot and humid conditions, the use of stimulants can lead to heatstroke, collapse and possible death.

Narcotics

Examples: Diamorphine (Heroin), pethidine, morphine, methadone

Narcotic analgesics are strong painkillers and can be found in both prescription and over-the-counter medications. They are used to reduce or eliminate the pain of injury or illness, or to increase the pain threshold so that the athlete can continue to compete or train. There are stringent national and international legal restrictions regarding the supply and possession of many of these drugs.

Side-effects: Loss of concentration, balance and co-ordination; sleepiness, decreased breathing rate, nausea and vomiting, constipation, restlessness, mood changes. They are highly addictive, leading to physical and psychological dependency. Long-term abuse often results in reduced mental and physical capacity. An overdose may cause coma and breathing difficulties and can result in death.

Anabolic agents

Include exogenous and endogenous anabolic androgenic steroids.

Examples: androstenedione, nandrolone, dehydroepiandrosterone (DHEA) boldenone

Anabolic androgenic steroids are a synthetic version of the male hormone testosterone, and are often used to improve sporting performance by increasing muscle size, strength and power, thereby allowing the athlete to train at a greater intensity and for longer periods. The anabolic effects can accelerate the growth of muscle and bone. The androgenic effects impact on the development of the male reproductive system and male sexual characteristics. They cause mood-altering, chemical changes in the brain and increase aggression and competitiveness.

Side-effects: Liver disease, certain forms of cancer, kidney damage, increased risk of heart disease, hardening of the arteries, depression, paranoia, aggression, stunted growth in adolescents, musculo-tendonous injuries, severe acne of the face, neck and shoulders. In males, they can cause the development of breast tissue and premature baldness, atrophy of the testes, decreased sperm count, infertility, enlargement of the prostate, and prostate cancer.

Beta 2 –agonists

These are commonly used to prevent or treat asthma. While most beta-2 agonists are banned there are exceptions, which are permitted by inhalation. If required, written notification from a recognised medical practitioner should be submitted to the relevant authority. When given systematically, beta-2 agonists may have powerful anabolic effects (increased muscle size, strength and power).

Side-effects: Palpitations, headaches, nausea, muscle cramps, anxiety, restlessness and insomnia, rapid heart rate, dilation of the peripheral blood vessels.

Diuretics and other masking agents

Examples: chlortalidone, furosamide, spironolactone, triamterene.

Diuretics are used to increase fluid loss from the body in order to decrease weight and are often used by athletes competing in sports with weight categories. They are also used in an attempt to dilute the urine so that banned drugs may not show up in a doping test.

Side-effects include dehydration, headaches, dizziness, nausea, muscle cramps, loss of co-ordination and balance. Severe dehydration can cause kidney and heart failure.

Masking agents are prohibited. They are products that have the potential to impair the excretion of prohibited substances or to conceal their presence in urine or other samples used in doping control.

Masking agents include but are not limited to: diuretics, epitestosterone, hydroxyethyl starch, probenecid, plasma expanders.

The Complete Prohibited list of substances and methods is updated annually and can be viewed/downloaded from

THE SAIDS WEBSITE www.drugfreesport.org.za OR

THE WADA WEBSITE www.wada-ama.org

Queries: Drug-Free Info Hotline (021) 448 3888

- Information on inadvertent doping and therapeutic use exemptions as well as testing procedures can be found on these websites.

TABLE 1. A DESCRIPTION OF THE MACRONUTRIENTS

	CARBOHYDRATE 17 KJ(4 KCAL)/G	PROTEIN 17 KJ (4 KCAL)/G	FAT 38 KJ (9 KCAL)/G
FUNCTIONS	Preferred source of energy/fuel	Needed to build and maintain muscle and to aid recovery. Needed for growth and development	Insulation and protection; provides essential fatty acids and needed for absorption of fat-soluble vitamins. Not an efficient source of energy.
STORES	Stored in limited amounts as glycogen in the muscle and liver. Training rapidly reduces reserves.	No storage form of protein as such but constantly being built up from a pool of amino acids and broken down again.	Easily stored in large amounts in adipose tissue; small amounts stored in muscle cells, but not readily available as a source of energy.
REQUIREMENTS Varies according to body composition goals and training needs.	5-7g/kg body weight	2-3g/kg body weight	1-1.5g/kg body weight
Too little	Inadequate intake leads to breakdown of muscle protein to supply much needed fuel.	Unable to maximise lean muscle mass.	Essential fatty acid deficiencies.
Too much	Excessive intakes will be stored as body fat.	Excess protein will be used for energy (not an efficient source) and can lead to weight gain.	Excess fat is stored as body fat and is detrimental to performance and health.
FOOD SOURCES N.B.	50g carbohydrate = 3 thick slices bread 2 cups porridge/cereal 1 cup pasta/rice or samp 3 med potatoes 1 cup baked beans 3 med portions fruit 250 ml fruit yoghurt/maas 500ml fruit juice/Coke 750 ml Sports drink Eat mainly carbohydrates rich in vitamins, minerals and fibre (whole grains, fruit and vegetables)	10g protein = 40-50g lean meat, chicken (no skin), fish or low-fat cheese 2 eggs 300 ml low-fat milk/yogurt ½-¾ cup dried beans, lentils or peas Choose low-fat dairy products and lean meats. Vegetarians will need specific guidelines.	5 g fat = 1 tsp margarine/butter 2 tsp salad dressing/mayonnaise/peanut butter avocado 10 peanuts 6 olives Fat is also found 'hidden' in many protein-rich foods and carbohydrate-rich snacks.

TABLE 2. A RESTAURANT GUIDE

RESTAURANT	RECOMMENDED	AVOID
ITALIAN	Italian breads without added butter, insalata (green salad) or caprese (tomato and Mozzarella salad); Minestrone (add little Parmesan); marinated calamari; pasta with vegetable or tomato-based sauce, or a lean meat (bolognese), chicken or a non-creamy seafood sauce; Pizza with half the amount of cheese and vegetable or fruit toppings. For dessert, order Italian ice cream or fresh fruit, capuccino (with foam).	Pasta with a creamy sauce (alfredo or carbonara); lots of cheese, pesto sauces, lasagne and cannelloni as these can be very high in fat; fatty meat; pizza with lots of cheese and fatty meat toppings. Heavily smoked and salted meats and cheeses served with antipasto.
CHINESE THAI MALAYSIAN	Steamed rice or noodles, topped with stir-fried meat, vegetables or tofu; chicken or a prawn steamed meal. Request that stir-fries be cooked only with a little oil. Clear broth soups.	Watch the oil! Battered or deep-fried foods (crispy), fried rice, spring rolls and deep fried finger foods; anything cooked in coconut cream or milk; duck.
INDIAN	Steamed rice – use as a base for the meal; lentils; chickpeas; Indian breads (pulkas, naan – no butter), vegetable, chicken or fish curry. Mulligatawny soup or a lentil soup. For dessert, opt for khur, a sweetened rice pudding.	Fried or battered foods (or dishes prepared with ghee or coconut milk); samoosas; fried breads; meat curries and fried vegetables. Dish up more rice and vegetables, and less sauce. Thick cheese puddings and honeyed pastries.
MEXICAN	Rather order individual items from the menu rather than large set main courses. Order rice, beans; tortilla. A fajita is the best option - combine salsa, rice salad and char-grilled beef or chicken strips or beans, all wrapped in a tortilla. Gazpacho or black bean soup. For dessert go for fruit.	Cheese; sour cream; fatty meat; corn chips; nachos.
GREEK	Dolmades; grilled calamari (without a butter sauce or deep fried), lean souvlaki (lamb marinated in garlic, lemon juice and olive oil), tzaziki (yoghurt, garlic, cucumber), hummus (chick peas and sesame paste) with pita bread. Fish baked in a tomato sauce.	Fatty meats; moussaka and pastitsio. Limit the use of olive oil. Casseroles made with plenty eggs and cheese. Baklava.

	Plenty of rice and orzo (rice pasta).	
JAPANESE	Control your fat intake by ordering foods that are “yaki” (broiled or grilled), “nimono” (simmered), or variations thereof. For example, beef teriyaki and chicken yakitori. “Shashimi” (raw fish) and “sushi” (vinegared rice prepared with seaweed, raw fish and/or vegetables). Cesium with shredded “wasabi” (strong horseradish sauce), tofu dishes and “miso” (fermented soybean) soup are good options.	“Tempura”, “agemono” and “katsu” refer to foods that are breaded and fried.
SOUTH AFRICAN	Ostrich and venison Samp & Beans Pap Lean bredies or curries Lean mince OR Fish Bobotie Smooresnoek Sago pudding Crustless milktart Bread and Butter pudding Pancakes with cinnamon, sugar or fruit	Pies/Samoosas Ribbetjies Boerewors Fritters Koeksisters
FAST FOODS (E.G. NANDOS, STEERS, MCDONALDS)	Salad or chicken burger or steak sandwich (grilled meat) or fish burger with chutney or tomato, barbecue or monkey gland sauce Chicken kebab or char-grilled chicken with rolls or pita bread or rice Baked potato topped with low-fat cheese or lean meat, chicken and mushrooms. Sandwiches (or toasted without butter), wraps, subs or rolls with lean meat, chicken/ cottage cheese/fish with lots of salads Lean meat or vegetable curry with rice Corn salad or three bean salad	Fried Fish and slap chips Gatsbies KFC Pies and pastries Quiche (e.g. bacon and plenty cheese) can be high fat Caesar salad

TABLE 3. PRACTICAL SUPPLEMENT GUIDE

CATEGORY / SITUATION	SUPPLEMENT	RECOMMENDED DOSE	SAFETY CONCERNS
LACK OF APPETITE	Liquid meal replacements* Carbohydrate (e.g. glucose polymer powders) and protein powders or mixtures (e.g. skim milk powder), sports drinks and gels and low fat sports bars	15-20% protein, 50-70% carbohydrate, low to moderate fat, vitamins and minerals. Sports bar: 50 – 65 g bar: 40 -50g carbohydrate, 5-10 g protein, low fat, low fibre	Over-reliance may lead to inappropriate replacement of whole foods. Choose lactose-free options if intolerant to lactose. Overuse may lead to weight gain.
HIGH ENERGY REQUIREMENTS	As above		
BUILDING LEAN MUSCLE MASS	Extra carbohydrate and protein as above and creatine	Rapid-loading 20-25g divided into 4 doses for 3 days taken with 50 – 100 g high GI carbohydrate, then followed by 2 g/day maintenance Slow-loading if wanting to prevent rapid weight gain 2-5 g/day for 28 days with 50 – 100 g high GI carbohydrate and adequate fluid post exercise. Cycling protocol – 20-25g per day for 3-4 days every 3-4 weeks	Weight gain initially due to water retention and later protein synthesis. Anecdotal reports of nausea, gastric upset, headaches, muscle cramps and strains. Limit to players over the age of 18 or well-developed players. Avoid if renal impairment and or elevated BP or thermal stress and or if on non-steroidal anti-inflammatories
RECOVERY FROM TRAINING/MATCHES	High GI carbohydrate supplements, Carbohydrate and protein combinations, Creatine	Protein hydrolysate (e.g Peptapro)	Avoid free amino-acids as they cause GI disturbances and can be neurotoxic.

INJURIES	Chondroitin Glucosamine sulphate Other specific nutrients related to the type of injury may be required	200 mg chondroitin sulphate 800 – 1500 mg/day glucosamine sulphate	Repairs articular cartilage, has mild anti-inflammatory properties. No evidence of benefit without cartilage damage.
IMMUNE FUNCTION AND STRESS	Pre-biotics and pro-biotics Vitamin C and vitamin B complex	E.g. yoghurts containing min. 1x 10 ⁸ viable CFU's/100 ml & more than 1500mg pure FOS or GOS per daily serving	Less chance of adverse effects and toxicity with water-soluble vitamins, but still advisable to avoid megadoses
DIETARY DEFICIENCY	Specific nutrients e.g. calcium and iron	Calcium carbonate or phosphate – 500 -1000 mg /day Ferrous sulphate/ gluconate/fumarate 100 – 300 mg elemental iron/day for 3-6 months with on-going monitoring	Will not correct poor diet Gastro-intestinal upsets, constipation, haemochromatosis.
EXTENSIVE TRAVEL	Portable, non-perishable pre-packed options like liquid meal replacements* Melatonin	3 mg stat (for sedative effect) 3 mg daily for 5 days (to restore diurnal rhythm)	May cause headache and dizziness. Should not be used with sleeping pills, warfarin, or by those with a history of migraine or epilepsy Under medical supervision

Note: All supplements are taken at players' own risk and the support team needs to be aware of medico-legal issues. Supplements do not compensate for poor food sources and inadequate diet.

*Keep to clinically based products such as Ensure, Nestlé Nutren Activ, as opposed to specific fat cutters or weight gainers that may be risky from a banned substance perspective.

CAFFEINE

Caffeine is a stimulant but it is not banned, so athletes may consider using it in training or competition. Caffeine use is monitored by WADA and overuse could pose a risk to a player's health and performance. The response to caffeine and its effects on performance can vary from person to person. At high doses, caffeine can cause nausea, diarrhoea, insomnia, trembling, headaches and nervousness. In addition, taking too much caffeine can increase anxiety and impair performance. It may also cause difficulties in falling asleep at night, a commonly reported problem amongst players using caffeine.

Caffeine at a dose of 1-3 mg/kg body weight (usually taken 1 hour before exercise) has been shown to enhance performance in rugby players (increased sprint times, accuracy for passing balls rapidly due to multiple mechanisms, including a direct stimulatory effect on the central nervous system; effects on muscle excitability and, increased fatty acid mobilisation thereby sparing muscle glycogen). Players should experiment in training, starting off with the lower doses and being aware of all foods and beverages that contain caffeine (coffee, tea, soft drinks, supplements and sport supplements, chocolate).

EXAMPLE: A TYPICAL EATING PLAN RECOMMENDED FOR A 90KG RUGBY PLAYER, OR A PLAYER >90KG NEEDING TO LOSE BODY FAT

Daily Allowance: 1 cup low fat milk OR yoghurt OR maas

BREAKFAST:

1 fresh fruit

Plus either 2 cups porridge (e.g. oats or mealie meal) OR 2 cups cereal (e.g. Cornflakes or All-Bran)

OR 4 slices bread/toast

OR 1 cup porridge and 2 slices bread/toast

OR 1 cup cereal and 2 slices bread/toast

Plus jam, syrup and sugar

MID-MORNING SNACK:

2 slices bread OR 1 roll OR 6 Provita

+ 2 slices low-fat cheese OR 2 boiled eggs OR 2 slices lean ham OR 2 tbsp peanut butter

+ 1 tsp margarine OR butter OR mayonnaise

LUNCH:

4 slices bread **OR** 2 rolls

+ 3 slices low-fat cheese and 3 slices lean ham **OR** 1 skinless chicken breast **OR** 1 tin tuna **OR** tin pilchards **OR** 1 lean beef patty

+ 1 tsp margarine **OR** butter **OR** mayonnaise **OR** avocado pear

OR

2 cups rice **OR** pasta **OR** samp **OR** pap **OR** 2 large baked potatoes + cup lean mince **OR** 1 tin tuna **OR** tin pilchards **OR** 2 cups cooked lentils/sugar beans/baked beans

+ 1 tsp oil

+ 2 fruit **OR** 1 cup fruit juice

MID-AFTERNOON SNACK:

1 cup low fat (2%) milk **OR** yoghurt **OR** maas

+ 2 slices bread **OR** 1 roll

+ 1 tsp margarine **OR** butter **OR** 2 tsp peanut butter + (Marmite, fish paste, jam optional)

DINNER:

3 pieces skinless chicken **OR** 3 lean meat patties **OR** 1 cup lean mince **OR** 3 fat-trimmed chops **OR** 300 g steak **OR** 3 fish fillets **OR** 2 cups beans and 3 cups maas/1 cup low-fat grated cheese/1 cup lean mince

PLUS

3 cups pasta **OR** 3 cups rice **OR** 2 cups rice and 2 potatoes **OR** 6 slices bread

+ 1 tsp oil **OR** margarine **OR** butter

PLUS

Vegetables/salad (eat at least 1 green and 1 orange vegetable every day)

PLUS

1 fruit

DAILY TRAINING REQUIREMENTS To cover training needs include an extra three recovery options (refer to Recovery). It is best to take this to training sessions and use during/after the session.

NOTE: ALL WEIGHTS REFER TO COOKED WEIGHTS

1 Tbs = 1 tablespoon = 15 ml

1 tsp = 1 teaspoon = 5 ml

CASE STUDY

Bokkie Small is a single, 24-year-old prop in a provincial rugby team. He lives on his own and is responsible for preparing his own meals. He weighs 125 kg, is 1.83 m tall and has a body fat content of 19 % (sum 7 skinfolds: 120 mm). He is very pleased with himself as he has managed to organise a sponsorship with a pizza/pasta outlet. He has also recently started to take creatine on the advice of his team mates, advising him that this is the best way to lose body fat without compromising his lean body mass and performance.

He needs to lose body fat and complains of extreme muscle stiffness and fatigue in the last 15 minutes of a match and during training.

His typical dietary intake is as follows:

8 am: 1 cup of coffee with 5 rusks and twice a week he eats fried eggs and bacon

1 pm: 1-2 toasted chicken mayonnaise sandwiches + 2 glasses of Coke

6 pm: 2x per week a pizza – his favourite toppings include mince, bacon, salami, avocado pear and extra cheese. Twice a week he eats pasta with a cream-based sauce or lasagne. Other nights he may braai boerewors or chops. He doesn't buy vegetables as he ends up throwing out rotten remains.

8 pm: 2 cups of coffee

He snacks on fatty biltong and droëwors and does not enjoy fruit and vegetables. He drinks 1 glass of full-cream milk, 1 glass of water, 1 Coke, 1 energy drink per day and saves up his weekly quota of alcohol for Saturday and Sunday, having 7 beers and 7 tots of spirits.

DIETARY RECOMMENDATIONS AND ADVICE:

KEY ISSUES	DIETARY CAUSES	STRATEGIES
1. HIGH BODY FAT	High fat diet	Choose lean proteins and low-fat dairy, low-fat cheese, introduce fish instead of fatty red meat; use chicken sausage for braais, add fruit and vegetables as well as lean ham to pizza, choose tomato-based pasta sauces; order sandwiches without butter; Choose low fat snacks – lean biltong and pretzels or popcorn. Choose poached or boiled eggs – add baked beans, grilled tomato and mushrooms instead of bacon.
	Alcohol	Limit alcohol to 3 drinks on an occasion and not after a game. First rehydrate with an energy drink after a game. Alternate alcohol with a soft drink/fruit juice.
	Skipping meals No snacks	Eat smaller, more frequent meals and snacks throughout the day – include fresh fruit, low fat yoghurt, sandwiches with low fat fillings, pretzels, unbuttered popcorn etc. Introduce a breakfast – either a cereal + low fat milk/yoghurt and fruit or an instant porridge.
	Supplements	Consider achieving fat loss goals, before introducing creatine supplementation.
2. LACK OF ENERGY AND FATIGUE	Skipping meals Inadequate carbohydrate	Eat smaller, more frequent meals and snacks made up of low GI carbohydrates, combined with lean protein sources - e.g. cereal/porridge + low fat milk, fruit and low fat yoghurt, pretzels/popcorn and lean biltong, crackers and/or sandwiches with low fat fillings. Eat more fruit and fruit juice to increase carbohydrate intake.
	No recovery plan	Implement recovery strategies – see Recovery snacks. Initially rehydrate/replenish carbohydrate

		stores with a high GI carbohydrate/protein snack.
3. LACK OF MEAL PLANNING	Lack of time Limited cooking skills	Purchase a stock of low fat convenience meals as well as a selection of frozen vegetables to avoid wastage Quick, easy ideas include: Baked crumbed chicken/fish with oven baked chips and peas Grilled chicken kebabs/chicken sausage served with rice or potato and mixed frozen vegetables Toast, scrambled egg and baked beans served with salad Quick-cooking noodles mixed with tuna and tomato/onion mix and salad Spaghetti with a lean mince bolognaise and vegetables
4. MUSCLE STIFFNESS AND CRAMPS	Supplements - creatine Fluid Recovery strategies	Reconsider the use of creatine – focus on eating plan and training. If using creatine after having achieved fat mass goals, ensure appropriate regime and dosage see SUPPLEMENTS. Ensure an adequate fluid intake and check that recovery strategies are in place.
5. RELIANCE ON EATING OUT	Sponsorship Lack of time management Other commitments	Choose pasta with tomato-based sauces and choose thick-based pizzas with low fat toppings to maximize carbohydrate intake (with little fat) – See Eat Out Guide

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Both dietitians have had over 20 years of experience consulting with athletes, coaches and teams ranging from a developmental to international level.

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