



Team Members:

-Sarah Adam  
-Danielle Sutherland  
Teacher – Mrs Sehji

Futureintec Ambassadors:

Aditee Naik  
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**SPORTS NUTRITION:**

Sport nutrition is the study and practise of nutrition and diet as it relate to athletic performance. Although training and practise is essential to be able to perform well in sport, your body also needs to be fuelled with the right nutrients. As the saying goes 'what you put in, is what you get out' this means that if you do not fuel your body correctly you will not get a good performance out of it. Eating well for sport is important for examples carbohydrates will help maintain and refuel muscle stores and prevent muscle tissue loss. Protein repairs and strengthens damaged muscle tissue and provides energy to working muscles when the carbohydrate stores are depleted. So just from these two examples you can see why nutrition is extremely important if you want to perform well in your sport. If you do not have the right nutrition this could mean that you do not perform at your best and stop you reaching your full potential. What you should eat before, during and after sport all contributes to your overall performance. You need the right nutrients in the right volumes to allow your body to function effectively; this is what sports nutrition is about.

**NEED FOR OUR PRODUCT:**

Both members of our team have a keen interest in a wide variety of sporting activities, both having represented Auckland and New Zealand in their respective sports. As a team we know how important recovery is to be able to perform at the optimum level consistently, and have struggled to find a product that meets our need of a balance between protein and carbohydrates. Cost is a huge factor that comes into play and also have found majority of products are too sweet, heavy and not enjoyable to consume directly after sport. Therefore we decided to direct our focus to this gap in the market.

## **OUR CLIENT**

Futureintec Facilitators introduced us to Aditee Naik and Bronwyn Munro. Aditee has got a Masters in Sensory and helped us partake in professional sensory evaluations of products already on the market as well as our own bar to help us develop and understanding of the perfect product. Bronwyn works for Horleys Sports Nutrition and has provided our team with her professional opinion and advice to improve our bar and has also sourced relevant products that we would not have been able to access otherwise. We have communicated with our clients via email to organise meeting and also to consult ideas.

## **BREIF**

Bronwyn Munroe is the assistant product manager of Horleys, has created an opportunity for us to develop a sports nutrition product. We are concerned that athletes and people that are physically active do not receive the required essential nutrients needed for effective, fast repair and recovery. We find that existing products are generally quite expensive, too dense and too sweet to consume straight after physical activity. Through discussions we have found that there is a gap in the market with banana flavouring. Therefore our aim is to create a natural (not processed) bar that is designed to consume after exercise and is light, not too sweet and is cost effective.

### **Key Factors:**

- Cost
- Size
- Skills
- Appearance (aesthetics) – natural/healthy looking
- Client needs
- Taste – not too sweet.
- Fit for the purpose
- Repair and recovery
- Use of specific ingredients and nutrient enhancing preparation methods (functional)

### **Constraints (barriers):**

- The ingredients we may want to use in our product may be too costly
- The amount of time that our team can be together
- Too many products already available in the market
- We may not have the skills to produce the ideal product
- The ingredients we may want to use may not go well together
- We may not have the resources or equipment needed to make our product

## **SENSORY EVALUTIONS**

Aditee Naik showed us the steps to be able to conduct a professional sensory analysis. She took us through this process trailing and analysing existing products so that we could see what texture, sweetness, and appearance we liked and to get a clearer idea of what we wanted in our product. After each of our many different trials we got our test taster to sample and then do a sensory evaluation on the product. We got them to rate each section (taste, texture, appearance and size) out of five. From these evaluations we discussed with our stakeholders and decided what our next step was and what we should do in our next trial.

## **VACUUM FORMING**

After discussions amongst ourselves we decided that our original way of cooking the bar as one (like a slice) and then cutting it into pieces was not very effective because the size and appearance of the bar was not satisfactory. The bars were all slightly different sizing and did not have a very nice appearance as they were very 'chunky' looking. Also some bars had the perfect crunch to them as they were the outside pieces but some did not. We went and talked to our Material Technology teacher Mr. Bennett who guided us towards making a vacuum formed mould to shape our bars in so then they could cook individually. This worked well and we got perfect shaped and sized bars to the dimensions 9cm x 4cm x 1cm every time.

## **METAL CUTTER**

When wanting to create multiple bars at once we found that the mould was not as effective because although it meant that the bars were perfect size, it was very time consuming as we could only shape each bar one at a time. We thought of creating a metal 'cookie-cutter' type tool to assist us in making this process a lot quicker. Now to create the perfect shaped bar we can make a whole lot of the mixture and then cut out the bars to then each cook individually. This will mean that the time consuming process of fitting all the ingredients into the mould will not need to happen and we will be able to create our bar at a quicker rate.

## **ORIGINAL RECIPE**

### Base:

- Melted butter, to grease
- 75g (1/2 cup) self-raising flour
- 75g (1/2 cup) plain flour
- 90g (1 cup) rolled oats
- 70g (2/3 cup) desiccated coconut

- 140g (2/3 cup, firmly packed) brown sugar
- 130g (2/3 cup) sultanas
- 95g (1/2 cup) choc bits
- 125g butter, melted, cooled
- 1 egg, lightly whisked

Topping:

- Nonstick vegetable spray
- 3 cups puffed wheat cereal
- 1/2 cup chopped cashew nuts
- 1/2 cup chopped pitted raisins
- 1/4 cup chopped dried apricots
- 1/3 cup creamy peanut butter
- 1/4 cup honey
- 1/4 cup light corn syrup

**ADAPTED RECIPE**

Base:

- 1/4 cup flour
- ~~75g (1/2 cup) self-raising flour~~
- 1/2 cup Bran
- 1/2 cup rolled oats
- 1/3 cup desiccated coconut
- 1/3 cup (firmly packed) brown sugar
- 1/3 cup) sultanas
- 40g butter, melted, cooled
- 1/2 egg, lightly whisked
- ~~95g (1/2 cup) choc bits~~
- Crossfire Banana Protein

Topping:

- Nonstick vegetable spray
- 1.5 cups puffed wheat cereal
- 1/4 cup chopped almonds
- ¼ cup sunflower seeds
- ¼ cup pumpkin seeds
- 3T sesame seeds
- ¼ cup banana chips
- 1/4 cup chopped pitted raisins
- 1/8 cup chopped dried apricots
- 1/8 cup chopped cranberries
- 1/6 cup creamy peanut butter
- 1/8 cup honey
- 1/8 cup light corn syrup
- Protein Chips

## **NUTRITION FOR RECOVERY**

When you exercise your muscles and bones are put under significant stress and your energy stores (in particular glycogen) become depleted. Exercise also promotes a catabolic state where your muscles start to breakdown and this continues post exercise until adequate nutrition is supplied to replace energy stores and promote anabolism (muscle growth) and recovery.

- Protein assists in building and repairing muscle tissue

-Cereal and eggs

Carbohydrates assist in muscle recovery by replacing glycogen and glucose stores lost during exercise. Carbohydrates are found in a variety of foods including whole grains, dairy products, fruits and vegetables.

Carb replacement should be consumed within 30 minutes after a workout

You can enhance this absorbing power by consuming a combination of high glycemic index (GI) carbohydrates and fast acting proteins, both of which are absorbed quickly. This combination of foods will promote the production of insulin, an important hormone that helps to convert the rising blood sugar into muscle glycogen (to replace energy stores) and promote muscle growth by transforming blood proteins into muscle. Immediately upon completion of exercise your muscles are screaming for nutrients and they will reach peak absorption capability within the first 30 minutes. Your main goal in this 30 minute window is to satisfy your glycogen needs by consuming carbohydrates.

Micronutrients play an important role in energy production, hemoglobin synthesis, maintenance of bone health, adequate immune function, and protection of body against oxidative damage. They assist with synthesis and repair of muscle tissue during recovery from exercise and injury.

The most common vitamins and minerals found to be of concern in athletes' diets are calcium and vitamin D, the B vitamins, iron, zinc, magnesium, as well as some antioxidants such as vitamins C and E,  $\beta$ -carotene, and selenium

B Vitamins:Thiamin, Riboflavin, Niacin, Vitamin B<sub>6</sub>, Pantothenic Acid, Biotin, Folate, Vitamin B<sub>12</sub>

The B-complex vitamins have two major functions directly related to exercise.

Thiamin, riboflavin, niacin, pyridoxine (B<sub>6</sub>), pantothenic acid, and biotin are involved in energy production during exercise,<sup>[46,51]</sup> whereas folate and vitamin B<sub>12</sub> are required for the production of red blood cells, for protein synthesis, and in tissue repair and maintenance including the CNS

Vitamin D is required for adequate calcium absorption, regulation of serum calcium and phosphorus levels, and promotion of bone health. Vitamin D also regulates the development and homeostasis of the nervous system and skeletal muscle.

The antioxidant nutrients, vitamins C and E,  $\beta$ -carotene, and selenium, play important roles in protecting cell membranes from oxidative damage

Calcium is especially important for growth, maintenance and repair of bone tissue, maintenance of blood calcium levels, regulation of muscle contraction, nerve conduction, and normal blood clotting. Inadequate dietary calcium and vitamin D increase the risk of low bone mineral density and stress fractures

Iron is required for the formation of oxygen-carrying proteins, hemoglobin and myoglobin, and for enzymes involved in energy production

Zinc plays a role in growth, building and repair of muscle tissue, energy production, and immune status

Magnesium plays a variety of roles in cellular metabolism (glycolysis, fat, and protein metabolism) and regulates membrane stability and neuromuscular, cardiovascular, immune, and hormonal functions.

<u>Ingredients for base</u>	<u>Nutrients</u>	<u>Properties</u>
Flour	Carbohydrate, Vitamin B1, B2, niacin, minerals	Base ingredient
Bran	Dietary fibre	Fibre
Rolled oats	Manganese, selenium, tryptophan, potassium, Vitamin B1, dietary fibre, magnesium, protein	
Desiccated coconut		Add to the taste of the bar
Brown sugar		sweetener
Sultanas	antioxidants	
egg	Tryptophan, selenium, iodine, Vitamin B2 (riboflavin) protein, vitamin B12, phosphorous, Vitamin B5, Vitamin D	Wet ingredient- binding agent

<u>Ingredients for topping</u>	<u>Nutrients</u>	<u>Properties</u>
Puffed wheat	Dietary fibre Vitamin B	texture
Almonds (chopped)	Anti-oxidants, helps to lower LDL, Vitamin E & B (riboflavin, niacin, thiamin, Bit B6) folate	
Sunflower seeds	Vitamin E & B (thiamin) manganese, magnesium, selenium, vitamin B5, folate	Firm but tender texture
Pumpkin seeds	Manganese, Magnesium, phosphorous	Sweet, nutty, chewy texture – also helps with natural (green) appearance

Sesame seeds	Manganese, potassium, calcium, iron, magnesium, zinc, selenium	crunch
Banana chips	Vitamin C, Iron, dietary fibre, Vitamin B6, magnesium, potassium, manganese, vitamin A	Crunch Banana flavour
Raisins (pitted)	antioxidants	High energy, low fat
Apricots (dried)	Vitamin C, A, beta carotene, dietary fibre	Colour to add to appearance. Apricot taste sells well on the market
Cranberries (chopped)	Vitamin C, dietary fibre, manganese	taste
Peanut butter	Manganese, tryptophan, Vitamin B3 (niacin) foliate	Flavour and wet binding ingredient
Honey		Wet binding ingredient
Corn syrup		Low cost sweetener and preservative
Crossfire Banana Protein	Magnesium, protein, potassium, calcium, vitamin A and vitamin C	Adds to the nutritional value and helps give banana flavouring.
Protein Chips	High protein	Increases protein for muscle recovery.

<b>Nutrition Facts</b>	
<b>User Entered Recipe</b>	
15 Servings	
<b>Amount Per Serving</b>	
<b>Calories</b>	209.6
<b>Total Fat</b>	11.0 g
Saturated Fat	3.7 g
Polyunsaturated Fat	3.3 g
Monounsaturated Fat	3.3 g
<b>Cholesterol</b>	35.8 mg
<b>Sodium</b>	36.1 mg
<b>Potassium</b>	224.1 mg
<b>Total Carbohydrate</b>	29.4 g
Dietary Fiber	3.2 g
Sugars	17.1 g
<b>Protein</b>	4.9 g
Vitamin A	3.5 %
Vitamin B-12	1.4 %
Vitamin B-6	6.1 %
Vitamin C	0.9 %
Vitamin D	1.6 %
Vitamin E	19.6 %
Calcium	4.6 %



Copper	14.5 %
Folate	7.4 %
Iron	8.4 %
Magnesium	10.2 %
Manganese	32.0 %
Niacin	6.1 %
Pantothenic Acid	5.5 %
Phosphorus	15.8 %
Riboflavin	5.4 %
Selenium	9.0 %
Thiamin	6.8 %
Zinc	6.6 %

\*Percent Daily Values are based on a 2,000 calorie diet.  
Your daily values may be higher or lower depending on your calorie needs.

<http://www.livestrong.com/article/448933-foods-to-help-recover-from-exercise/#ixzz1Y0vpOtHi>

<http://www.expert-nutrition.com/post-workout-meal.html>

<http://recipes.sparkpeople.com/recipe-calculator.asp>

## **PROBLEMS TO OVERCOME**

When we changed from cooking the bars as a slice to cooking the individually a problem occurred because the base could not longer rise because of the layers of topping on it. Instead of rising, the base mixture would seep out the size making the bar lose its shape. To stop this from occurring we took out the self-rising flour and replaced it with plain flour. This meant that the mixture did not rise or seep out of the sides. Through research and discussion we found that bran is a healthier alternative to plain flour. We trialled using bran instead of plain flour and came to the conclusion that by using half bran, half flour that the taste of the bar would not be effected but the nutritional value would be increased. We adapted our recipe to create the more nutritious change.

Originally we just had the base layer with one layer of topping. We found that the two layers did not stay together very well. We did a trial putting some of the topping mixture into the blender to make it more combined and so it would stick together better. This worked and the bar created was a lot better combined and stayed together better. Feedback from taste testers meant that although this bar held together a lot better it was not as visually appealing as the original topping because it looked more 'processed'. To overcome this problem we decided to create a 3layer bar having the base on the bottom followed by a layer of the processed topping to hold the bar together and then the original topping on top to maintain the visual natural appearance.

## **EVALUATIONS**

### Banana Flavouring/fillings:

#### Barkers Banana Smoothie Base:

It is a thick liquid that would not be suitable for the base, as it would add to the moistness of it, which we are trying to avoid and get lower. We potentially could incorporate a small amount seeming, as it is concentrated into the liquid component of the topping layer.

#### Barkers Banana Patisserie Filling:

Too high in liquidity, therefore would lower the shelf life and quality of our product. As a result of our last trial when we used mashed banana, this would create the same effect on our bar of mush rather than the crunch we are looking for. It has a foul smell that you can distinctly smell the preservatives.

#### Horleys Banana Smoothie Flavour:

We particularly liked this product and based on the nutritional facts as it will add protein value to our bar, which is a main component of our brief. When mixed as a shake, it has an appealing taste and would add natural sugars to our bar. We are going to trial this in the base mixture as we think it would complement our bar.

### Soy Crisps:

#### Plain Soy Crisps:

Had a natural tasting flavor, but would add to our bar because of the texture and crunch of the crisps. Potentially these could go soft because of the liquid content in the bar so we will add them on top of the bar after the liquid has been added.

#### Chocolate Soy Crisps:

These do not have a pleasant after taste and are going away from the look we want with no chocolate in our bar. Based on this we have opted for the plain taste.

#### Trial Two Evaluation:

In this trial we trialed the method of putting the topping in the blender so that the bar would combine better and be less crumbly. We then compared this with the original method of using the ingredients in their original state.

Sample one was the original method. Taste testers liked the fact that it looked more healthy/natural and 'not as processed looking' as sample two. People were generally extremely happy with the taste. The bar was enjoyed because the testers could not tell that there was protein powder in the bar. This was because it was light and not 'heavy' like traditional protein bars are.

For next time I would recommend we trial making a three layered bar. This could be done by combining the three layers that we have made. I would have the oat base and then put a layer of the muesli bar recipe that has been combined in the food processor and then on top have a layer of the original recipe. This would mean that the ingredients would be able to stick together nicely and we will also get a healthy looking bar that people like.

#### Trial Three Evaluation:

##### WHEAT GERM BASE:

- Mixed well with the dry ingredients
- Didn't effect the taste of the bar

##### BRAN BASE:

- Gave an improved texture
- It is a healthier option to flour, which meets the specifications of our brief
- Didn't take away any other flavours in the bar, mixed well

##### CRANBERRY:

- Added more flavour to the bar
- Enhanced the nutritional value of the bar

##### SESAME SEEDS:

- Enhanced the bar visually, could potentially sprinkle the seeds on the top of the bar for visual appeal
- Did not drastically change the taste of the bar
- Mixed well with the other nuts

In final bar after looking at the nutritional information, we wish to include bran in the base and a mix of the cranberry and sesame seeds in the topping as these will be most beneficial in our product along with our other chosen ingredients.

#### Trial Four Evaluation:

##### BANANA CHIPS:

- Too crumbly
- Did not stick to the base
- Could incorporate the banana chip into the base so it sets in it (like a sandwich) or could crush it up and mix it in the topping

##### BANANA PUREE:

- Made the mixture soggy and effected the base
- Did not last even a day, taste and colour, not enough shelf life. It turned brown due to oxidation
- The texture was unappetizing
- Tasted off
- Didn't like the fresh banana taste
- Did not look appealing

##### VANILLA AND BERRY FLAVOURING:

- Made it taste artificial
- The smell was not nice when mixed together, although when by themselves it tasted fine
- Mixed well into the other ingredients
- If we were to use this in future we would put the flavor in the base instead of the topping and use liquid vanilla or vanilla pods instead as a natural alternative
- A barrier is that we are aiming for a natural bar, this would go against that as it is an artificial flavour

##### JAGGERY (in base, substituted for brown sugar):

- When preparing the mixture the jaggery did not separate well and created clumps in the mixture. When cooked it melted and lead to bubbles of jaggery and holes in the base.
- Did not like the taste
- Made the mixture too sweet
- Too expensive (is more expensive than brown sugar)
- Would choose brown sugar over jaggery

##### ORIGINAL BASIC RECIPE:

- Tasted nice
- Ingredients worked well together
- Need to cook it in the oven for longer so that the mixture stays together and it goes golden
- Also cook until the base is crispy
- Base was an ideal thickness
- Incorporate bran in the base to substitute for half of flour mixture

##### TOPPING:

- Need to get it crisper and more golden by cooking for longer, otherwise nice sweet taste

- Need to sort out liquid to dry ratio

#### Trial Five Evaluation:

We experimented with both whole and crushed banana chips and put them in different places in the bar. We tried putting a whole banana chip sandwiched in between the base mixture. We found this did not work very well as it was difficult to keep the base together because the surface area of the banana chips was too hard so there was not enough room for the base together so the base easily crumbled. It also meant that our ideal thickness of the base was altered as the banana chips made the base thicker. Because of this we will not use whole banana chips in the base of our final recipe.

We also tried crumbling the banana chips between the base and the top mixture and this did not have a big effect on the bar, as was a small addition that worked well. The crumbling worked better than whole banana chips and did not alter the size of the bar. It was easy to mould the mixture around them also, which made the constructing process of the bar a lot easier.

Likewise to this, we tried sprinkling the banana chips on top of the bar and it worked well with the mixture and added to the visual appeal as it introduced another colour and gave it some texture.

We think that we could improve the visual appeal of the bar by putting sunflower seeds on top of the bar. Not only does this add to the nutritional value but it also helps give our bar the healthy natural visual appeal that meets our brief specifications.

We observed the base of the bar and it seemed too greasy and this meant that when the bar cooked you could see the butter and the mixture was very wet. This extra butter differs away from the healthy image we wish to portray as it adds to the saturated fat content. Currently we are using 125g of butter as said in the original recipe, but we are going to minimize this to 75g as recommended by food technology teachers at the school. By using less butter it will mean our bar is less sticky and greasy, but the amount will still keep a good shelf life. This means it will keep to the brief guidelines of a sports nutrition bar.

Because we want our bar to be compact we decided to eliminate the ½ cup of self-raising flour and replace it with bran. This decision was both based on the element of being compact but also complication through this trial. When we put our bar in the oven to cook, instead of rising it spread outward losing the shape of the bar, which looked very unappealing. This was prevented by topping being too heavy for the base to rise. By substituting the self-raising flour for bran this contributes to the nutritional value of our bar.

Throughout this trial each of the bars we made was made in the mould, therefore this replicated the exact size we wanted and it complied with our brief. By using the mould and packing the mixture upside down, this made it a lot easier to push down each layer onto one another and it also made the bar more compact. This kept the weight down also.

We now have to work out the exact cooking times for both the base and the topping as they have altered from our original trials because instead of making a whole slice, we are only using partial bits of the mixture to make individual bars therefore the cooking time is lessened.

#### Trial Six Evaluation:

We decided it was important getting near the final product that we needed to figure out the exact cooking time for the base and topping. We did this by putting a bar in every minute up until 7 minutes to find the perfect cooking time. After the 7 minutes we inspected and tasted the bars to see what tasted and looked the best cooked.

#### *Base*

We decided that 5 minutes was not quite long enough, but 6 minutes was too long as it started to get overcooked around the outside. We then put in a bar, based on this in the oven for 5 and half minutes.

5 and half minutes were perfect for this bar. It appeared to be golden and crispy around the outside and soft in the middle, and tasted the best as it was cooked to perfection.

#### *Topping*

We found that 4 minutes was exactly the right amount for cooking time as any time before this was still too sticky and not crunchy, and any time after this was starting to get burnt.

Because the topping and the base are slightly different when we make our bar we will put our base in for a minute and a half and then add the topping to cook for the remaining 4 minutes.

#### Trial Seven Evaluation:

In trial seven we used rice syrup instead of glucose syrup in the topping. This is because it is cheaper and can be brought commercially for even less. This did not change the taste and so worked well as we were happy with the taste that we had created.

The feedback we got from the trial was all positive and no further changes need to be made to the bar based on this feedback.

Next time we create the bar we will need to trial our new metal cutter to be able to make the bar in a quicker time making it easier to produce in larger quantities.

From this trial we have confirmed our final recipe and have got a final prototype.

From here we need to sort out exactly how we are going to package the bar.

### **PACKAGING**

After looking and analysing existing packaging we came up with our own original Racey Recovery Packaging. We decided that we want to have an environmentally friendly packaging that is made out of materials that are sustainable and eco-friendly to maintain the natural appearance.

## **FEEDBACK**

After each trial we got people to test taste our product. After our first trial we discovered from the feedback that the sweetness and density was good as people thought that it did not seem as heavy to consume as Sports Bar that are on the market. But was quite crumble and too 'chunky' in size to consume after sport. From this feedback we then decided to trial putting the topping mixture into the blender to that the particles had a bigger surface area and so that they would bond better together and with the base so the bar was less crumbly. From this trial our feedback from test taster was that this concept was good as it was a lot less crumbly but it looked a lot more processed and less natural looking that the bar which topping had not gone through the blender. From this feedback we thought that we could incorporate both concepts and have a three layer bar so that the bar would combine well with the layer of processed mixture in the middle but still maintain the appealing natural look with the original topping on top. We trial this and the feedback was all positive with comments like "I would definitely want to eat this after sport, it is light, natural and not too sweet and processed like the protein bars I normally have to eat, its just right!". After further trials we then got a recipe that we were happy with and got the size and shape of the bar to perfection. We trialled the bar with our school 1<sup>st</sup> XI Hockey team after one of their competition games. The feedback from this was extremely positive. The girls were more than happy to eat the bar after their game as it was easy to consume and was not too sweet. They were happy that finally there was a Sport Recovery bar that did not have chocolate or other things that were too sweet to consume straight after sport. They also said that it was good because a lot of the bars that they consume are very dense and too filling after sport, they just want something light which gives them the nutrients they need for recovery. From this feedback we know that the bar meets our brief of being the right shape, size, natural appearance and there is a want for it in the market.

Our clients Aditee Naik and Bronwyn Munroe consistently gave us very positive feedback each time we had a meeting and they trialled our product. This meant that we were encouraged and very eager to keep working on and improving our product. Each meeting we would discuss our ideas with our clients and work out what we would do in the next trial to improve.

## **FINAL OUTCOME**

After multiple trials we produced our final recipe and prototype. We are extremely happy with the outcome and have no further changes that we would want to make to the bar. The taste, texture, appearance and size are all how we wanted them and from feedback from our stakeholders and taste testers Racey Recovery is enjoyed by all. From the rough nutritional values that we calculated we are also pleased as we stuck to our brief to create a bar that is both protein and carbohydrates with other main ingredients that through out research we found to be very important in muscle recovery. This means that our bar covers our want for a repair and recovery bar and so it fit for its purpose. As a team we managed to have all the skills and tools used in the making of our product, when help was required we talked to people that had knowledge in the area and got their assistance. Our bar size of 9cm x 4cm x 1cm and weight of 45g has proven from feedback from taste testers and stakeholders to be perfect size to consume after sport. Our bar has got the very appealing natural 'homemade' look about it. This is due to our wide range of natural ingredient used and you are able to see all of the ingredients in the bar. We look forward to using our final recipe and new metal cutter to make our final outcome for the judging evening.

## **FUTHER WORK TO BE DONE:**

We think that we have done enough trials and our clients, stakeholder(s) and the team are satisfied with our final product and so no further work would need to be done with development of the recipe. For a mass production in a factory proper equipment to assist with the layering of the bar would have to be looked and according to our client (Bronwyn Munro) may need to be created. Our team is having a meeting with the product development team from Horleys sometime after the 19<sup>th</sup> of September as Bronwyn is currently away on leave.

To get our product on the market further work would need to be done to create a more professional packaging and more accurate nutritional evaluation of the bar. It would then need to marketed and put onto the shelves.





**Comment [Diocesan1]:** Team members:  
Bronwyn Munro from Horleys  
Danielle Sutherland  
Sarah Adam



**Comment [Diocesan2]:** Futureintech Ambassadors introducing the BRIEF  
Ex- Facilitator- Fiona Barrow  
Bronwyn Munro from Horleys  
Aditee Naik



**Comment [Diocesan3]:** Research:  
Looking at existing energy bars in the market



**Comment [Diocesan4]:** Disassembling existing products similar to our initial idea for the recovery bar. We found that the product contained a very low amount of fruit and nuts. It was quite dense and had artificial flavouring in it. Although the product was advertised as nice and natural the ingredients seemed quite processed. This knowledge informed us to look at developing a product that would incorporate more fruits and nuts and improve the texture so it was less processed.



**Comment [Diocesan5]:** Trial 1 testing: Basic Recipe  
 Trial 2 (we tried two different methods)  
 1. Processed topping partially in food processor  
 2. Used ingredients in its state



**Comment [Diocesan6]:** Wider stakeholder(s) Sports Prefect Lucy Creighton taste testing. She enjoyed both trials but said that the 2<sup>nd</sup> method was successful appearance wise as it seemed more natural and less processed. However, it was a bit too crumbly.  
 Next time we would trial a 3 layer method (refer to notes in the report)

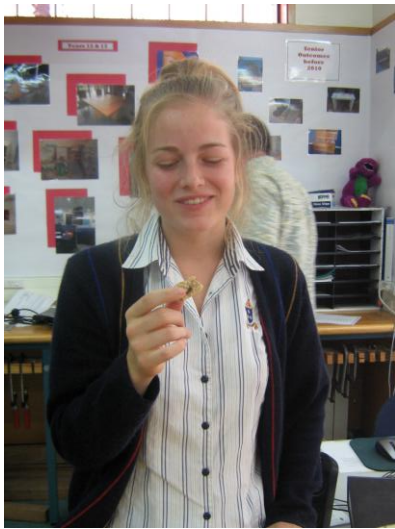


**Comment [Diocesan7]:** Trial 2 (method- less processed)



**Comment [Diocesan8]:** Stakeholders taste testing Food technology teachers and staff members below in the pictures





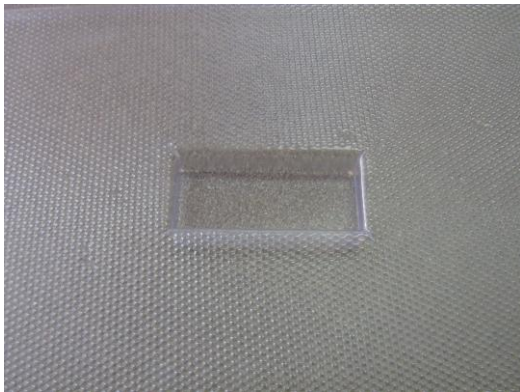
**Comment [Diocesan9]:** Hockey player-Auckland Representative. "I would love to have this bar after my game"



**Comment [Diocesan10]:** Trial 3  
 1. Bran base  
 2. Nutella topping (not for for purpose as it did not meet the specification of our brief which was to make a product that did not have any chocolate in it. Discarded this idea.  
 3. Sesame seed and cranberries in topping  
 We also tested shelf life and the products were fine even after 4 months We decided we would develop a banana flavour bar following a discussion with our client Bronwyn Munro as there is a gap in the market for this.  
 The first bars we trialed weighed 100g



**Comment [Diocesan11]:** Wood cut out for energy bar mould for vacuum forming. Dimensions:9cmx4cm



**Comment [Diocesan12]:** Vacuum Formed mould for the energy bar. Photos of process attached on a separate sheet.



**Comment [Diocesan13]:** Trials 4 to incorporate Banana Flavour and try different bases

1. Fresh banana puree/pulp
2. Banana chips- whole in between base and topping
3. Banana chips crushed and in the base
4. Banana smoothie base mixed in topping

We also used some broken banana chips as a sprinkle on top



**Comment [Diocesan14]:**  
Weight 60g



**Comment [Diocesan15]:** Trial 4  
Trialling commercial flavourings  
1. Banana  
2. Berry flavour  
3. Strawberry and vanilla  
4. Jaggery Base

Problem: the base spread in the oven as it probably had more butter and self raising flour

Next time we will try a different cooking method and change to plain flour.

Reduce amount of butter from 90g to 40g

Flavour was too strong and artificial and since we wanted a product that was natural our claim had to be true so discarded addition of artificial flavours. The jaggery was inconvenient as it was in a large block and so was hard to cut. It formed clumps of jaggery in the mixture and those clumps melted and bubbled when cooked and meant there were holes in the base. This along with the cost and availability meant that we decided that it will not be used.



**Comment [Diocesan16]:**

Trial 5

1. Changing cooking method and baking with the topping facing down so it would not spread like last time

2. Banana chips sprinkled on top

3. Whole chips in base

4. Crushed chips in base

5. Added sunflower seeds and banana chips on top



**Comment [Diocesan17]:** Testing cooking times. The best time to cook the base was 5 ½ minutes at 180C. the topping took 4 minutes to cook and so what we are going to do is put the base in the oven for 1 ½ minutes and then add the topping and cook for the remainder 4minutes.



**Comment [Diocesan18]:** Vacuum sealing products for taste testing by client





**Comment [Diocesan19]:** Trial 6  
Still used glucose syrup but looked at other options after a discussion with Virginia Scott from Invita. So next time we decided to use rice syrup  
We also added Crossfire banana smoothie powder (banana flavour)



**Comment [Diocesan20]:** Weight: 40-41g



**Comment [Diocesan21]:** Virginia Scott from Invita and Bronwyn Munro taste testing

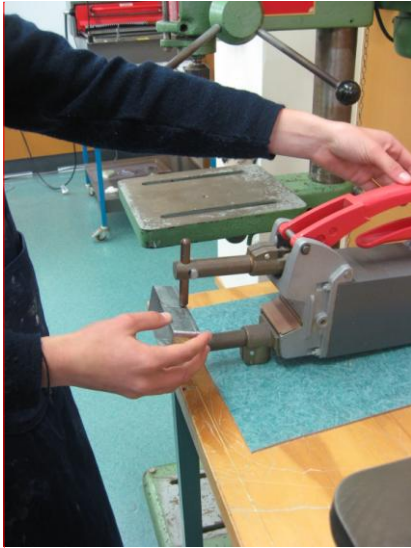




**Comment [Diocesan22]:** Year 7 students taste testing



**Comment [Diocesan23]:** Using a Spot Welder to make our metal stamp/frame/cutter



**Comment [Diocesan24]:** Spot Welder being used to join the metal ends together



**Comment [Diocesan25]:** Metal frame constructed to make multiple bar and maintain consistent and uniform shape and size. This also helped us with time management and less manual labour and time effective than the vacuum formed mould



**Comment [Diocesan26]:** Prototype with rice syrup



**Comment [Diocesan27]:** Taste testing of prototype  
1. Julia Parker (new futureintech facilitator)  
2. Aditee Naik (masters in Sensory evaluation)  
Bronwyn Munro



**Comment [Diocesan28]:** Thank you to our mentors for all the support they have provided for our Racey Recovery project



**Comment [DSfG30]:** Final Packaging- after looking at existing packaging, we wanted something that was eco friendly and visually appealing. After consulting our stakeholders (staff members) said it was a bit hard to read the 'racey' in Racey Recovery. We could look into tweaking the 'a' for more clarity.

**Comment [DSfG29]:** Looked at and analysed existing packaging to create our own

Date	What we did	Bibliography
9/02/11	Introductory to CREST	
11/02/11	Looked through CD and worksheets.	
13/02/11	Discussed ideas with everyone.	
23/02/11	Decided on final product of a sport nutrition bar	
24/02/11	Started ingredients research. Looked at magnesium	<a href="http://www.nlm.nih.gov/medlineplus/ency/article/002423.htm">http://www.nlm.nih.gov/medlineplus/ency/article/002423.htm</a> <a href="http://www.springboard4health.com/notebook/min_magnesium.html">http://www.springboard4health.com/notebook/min_magnesium.html</a>
25/02/11	Revisited CD to be able to start initial brief	
27/02/11	Wrote Initial brief/introduction to sports nutrition	
1/03/11	Did a context analysis to organise who was doing what and also wrote list of what needs to be done.	
2/03/11	Talked to dietician <b>Mary Rose Spence</b> and researched food compositions.	
3/03/11	Talked to nutritionist <b>Brigid Chunn</b> and then looked at healthy food guide magazine articles.	
5/03/11	Collected all articles related to our topic	<a href="http://www.healthyfood.co.nz/articles/2009/march/how-to-eat-for-exercise">http://www.healthyfood.co.nz/articles/2009/march/how-to-eat-for-exercise</a> <a href="http://www.healthyfood.co.nz/articles/2009/march/how-to-eat-for-exercise-when..">http://www.healthyfood.co.nz/articles/2009/march/how-to-eat-for-exercise-when..</a> <a href="http://www.healthyfood.co.nz/articles/2009/june/ask-the-experts-protein-bars-vs-muesli-bars">http://www.healthyfood.co.nz/articles/2009/june/ask-the-experts-protein-bars-vs-muesli-bars</a> <a href="http://www.healthyfood.co.nz/articles/2007/october/weight-training-do-you-need-protein-shakes-and">http://www.healthyfood.co.nz/articles/2007/october/weight-training-do-you-need-protein-shakes-and</a> <a href="http://www.healthyfood.co.nz/articles/2009/march/ask-the-experts-magnesium-for-cramp">http://www.healthyfood.co.nz/articles/2009/march/ask-the-experts-magnesium-for-cramp</a>
8/03/11	Starting writing constraints and needs and how we are going to go about our project.	
10/03/11	Finished writing constraints, needs and how we are going about our project.	
15/03/11	Had second meeting with <b>Bronwyn Munroe</b> to discuss brief and product development.	
17/03/11	Research a few simple protein/energy bar recipes.	<a href="http://dairyfreecooking.about.com/od/breadsbakery/r/proteinbar.htm">http://dairyfreecooking.about.com/od/breadsbakery/r/proteinbar.htm</a> <a href="http://sportsmedicine.about.com/cs/nutrition/a/aa062403a.htm">http://sportsmedicine.about.com/cs/nutrition/a/aa062403a.htm</a>
18/03/11	Discussed and decided on what we are going to cook for first trial.	
23/03/11	Did the first trial recipe and did analysed how it went.	

29/03/11	Researched an oat bar recipe to use as a base for our second trial. Made food order for 1/04/11	<a href="http://www.taste.com.au/recipes/2706/choc+chip+oat+slice">http://www.taste.com.au/recipes/2706/choc+chip+oat+slice</a>
30/03/11	Calculated the nutritional value of trial one	<a href="http://allrecipes.com//HowTo/cup-to-gram-conversions/Detail.aspx">http://allrecipes.com//HowTo/cup-to-gram-conversions/Detail.aspx</a> <a href="http://recipes.sparkpeople.com/recipe-calculator.asp">http://recipes.sparkpeople.com/recipe-calculator.asp</a>
1/04/11	Did trial two	
2/04/11	Printed pictures from the trial into a flow diagram	
06/04/11	Calculated nutritional value of trial two.	
12/04/11	Prepared food order for 5/5/11. Looked in pantry and discussed the different ingredients to add and trial in the bar.	
13/04/11	Researched wheat germ	
16/04-1/05	Holidays – individually worked on U.S.2.2.	
05/05/11	Did Trial three, did three different trial toppings, and two different trial bases. Gave to 1 <sup>st</sup> XI hockey team after their game and got very positive comments.	
06/05/11	Meeting with Bronwyn and Adete, they trialed and enjoyed our bar, thought trial three was the best and loved the bases. – Bronwyn to contact suppliers about different flavouring	
10/05/11	Looked into Jaggery compared to brown sugar	
14/05/11	Evaluated Nutritional value of trial3.	<a href="http://recipes.sparkpeople.com/recipe-calculator.asp">http://recipes.sparkpeople.com/recipe-calculator.asp</a>
17/05/11	Evaluation of trial3	
18/05/11	Wrote list of things that still need to be done. Rang Robert Murphy (invita) – he said that berry flavouring would be the best because berry, vanilla and chocolate are the top sellers on the market. So he is sending us a sample.	
20/05/11	Looked at what the nutritional values of the bar where for each different adaptation in trial three. Sorted out what worked the best to use for the next trial	
25/05/11	Calculated an approximate cost of the bar	
16/05/11	Did Trial 4, jaggery vs brown sugar And also used the different banana ingredient and flavourings that Invita	

	and Browyne sent us.	
18/05/11	Meeting with future Intec Ambassadors	
20/05/11	Evaluation of trial 4	
30/05/11	After vacuum sealing the bar from trial 3, 30 days later the bar is still edible meaning it has good shelf life	
1/06/11	Looked into different ways of cooking the bar. Talked to Mr Bennet (hard material technology teacher) on the best way to go about cooking the bar.	
2/06/11	Food order for trial 5	
09/06/11	Made a mould using the vacuum former.	
12/06/11	Did trial 5 using new mould and trying different methods of using the banana chips	
15/06/11	Evaluation of trial 5	
16/6/11	Use some left over mixture to do a trial on the bar cooking times	
18/6/11	Evaluation trial 6	
20/06/11	Meeting with Futureintec Ambassador	
22/06/11	Food order for trial 7	
23/06/11	planning	
26/06/11	trial	
28/06/11	Meeting with Futureintech ambassadors	Thank you to Virginia Scott from Invita for sponsoring us (also suggested that we use rice syrup instead of glucose syrup)
13/07/11	Food order for last practical	
16/07/11	Trial 7 on final bar.	
	Discussed how the 'mould' packaging took to much time and discussed ways of making this more efficient	
	Talked with Material Technology teacher and produced a metal mould to form our bar	
22/07/11	Mrs Sehji had last meeting with FutureIntec Ambassadors as we were both away on hockey tournament.	
25/07/11	Created two different logos	
29/07/11	Chose final logo	
31/07/11	Worked on poster	
2/08/11	Worked on poster	
7/8/11	Took photos in photography room of bars	
8/8/11	Worked on poster	
15/8/11	Did Report	
16/8/11	Completed report	

17/8/11	Completed poster	
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