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Drying fruits as a business model for an orchard

Advisory report to Hekkert's orchard

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This report describes the results and recommendations of the assessment of a potential business model for the orchard of Mr. W. Hekkert, Terwolde, focusing on drying fruits for organic muesli.

Key words: orchard, drying fruits, agroforestry.



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Executive Summary

The owner of a unique orchard of six ha with 600 trees, composed of 220 different species of apple, pear, prune and cherries and managed in a natural way, is investigating the possibilities to start a small processing unit for producing dried fruits for muesli. This report provides an evaluation of possible business-plans for producing Muesli composed of dried fruits and naked oats as a family business.

The business plan shows that, with a total yearly costs of EUR 2.814 the business could yield cumulative net profits of EUR 6.370 per annum, while maintaining adequate levels of liquidity. It should be noted that labour costs are assumed to be zero. The market for the Muesli consists of three segments: regular local customers (individuals and families), selling in off premises or at farmer's markets and supplying to regional small hotels and B&B's.

Looking at the cost-benefit calculation and the required labour, we conclude that in the present situation the farmer, will practically be better off by continuing as he has been doing: selling fresh fruits directly to consumers, provided the fruits are of good grade. Only if pricing of fresh fruits will further decline, market alternatives might become attractive. Additionally to fruits, the farmer might grow naked oats and sell this to customers, which will provide a good alternative source of income.

If the farmer wants to start explore the process of drying fruits the first next step we advise is to start to produce small numbers of packaged (250g) dried fruit and oats and sell these samples as pesticide-free healthy breakfast muesli to his regular customers and potential bed & breakfast lines, or to produce muesli mixes of customer's choice with his different types of fruits and nuts. He could offer different mixes of bio muesli with a unique ratio of fruits attuned to customer's favourites.

If it turns out that customers appreciate specific products and mixes, he could consider to scale up the production. It is clear from our investigation that this product is only beneficial, if larger volumes are produced and sold. Based on a cautious market exploration, the farmer could make better decisions and calculations better to decide to what extent he should increase his business.



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1. Introduction

In this report, information is provided about the feasibility level approach of starting up production of bio muesli with dried fruits from an orchard, as an alternative to selling just fresh fruits, at the farm of Mr. Hekkert. A business plan is developed to know the opportunities of the farmer to increase the storage life of fruits and to expand the market situation.

Different methodologies, like the business model canvas, financial analysis and value chain mapping are used as inputs which provided us a structural framework that helped us to understand the feasibility of the business plan.

This is a preliminary analysis based on the information gained through meetings with the farmer and previous research done by students.

After all, in the agricultural sector fruits have particular features: their contents of nutrition are very high and they have to be preserved. Moreover, they are seasonal in nature and due to their low shelf life after harvest they are sold in the markets at very low prices. There are many methods of fruit preservation, but drying or a dehydration process is the most common. It's also the ancient and traditional method of food preservation which helps remove any extra moisture besides increasing the storage life and preventing the nutrient loss.

- Oats are among the healthiest grains on earth. They are gluten-free whole grains and a great source of important vitamins, minerals and fibre. Oats have valuable nutritional and health benefits with high levels of beta glucan, antioxidants and lysine. Naked oats are a veritable nutritional powerhouse that can help reduce cholesterol, ward off heart diseases and build muscle. It is also suitable for gluten-free diets for celiac patients. The naked oats are also seen as a key nutritional weapon in the fight against the global hunger problem. Naked oats are the latest in a long line of innovations to come out of agriculture and agri-food leading to more varied, more nutritious, sustainable and higher quality food (Elsevier, 2017: scientific database recently released genotypes of naked oat (*Avena nuda* L.)

The final product is a blend of naked oats and naturally dried fruits which make it a great and healthy breakfast option. Dried fruit pieces have to be mixed with rolled oats to make muesli which is the final ready-made product available in pre-packaged dry form.

The purpose of this study was to determine the possibility to start a processing unit which improves the shelf life of fruits and also financial benefits of the farmer.

Currently, Mr. Hekkert is selling his fresh produce to local consumers and suppliers during season. The idea for this research is to reduce the wastage of naturally produced fruit production and improve shelf life which allows him to store and sell his produce during all the seasons. The farmer has shown a keen interest in producing and selling a new product other than the regular fresh product he sells.



Objectives:

- To offer customers an excellent and alternative naturally produced healthy product, at a reasonable price and generating positive cash flow from operations which are better than the current income from selling fresh fruits.
- Drying of fruits to increase storage life and rolling of oats to get them easily cooked.



2. The orchard

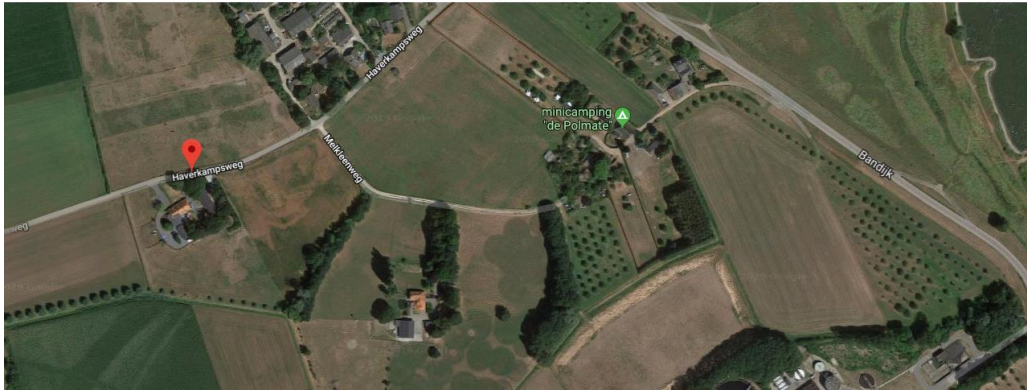


Figure 1: Aerial view of Hekkert Orchard

Hekkert owns six hectares of fruit orchard which is ten years old with 220 former and new species of in total nearly 600 trees. These trees on the Orchard comprise both fruits and nuts which are cultivated naturally. The fruit trees include 188 apple trees, 122 pear trees, 253 prune trees and few cherries. There are 29 walnut trees which are the only nuts grown. Some species of fruit trees are of ancient varieties for which he receives subsidy for conserving them. We visited Hekkert's farm to study his situation and interests and maintained constant contact with him in order to provide a sound business model. He is interested in producing Muesli which is a cold breakfast cereal dish based on rolled oats and dried fruits. This mix may be combined with one or more liquids like milk, almond milk, other plant milks, yoghurt or fruit juice and left for a while to soften the oats before being consumed.

Mission and vision:

Bio muesli mission is to offer residents of the local area the best quality product. Hekkert is committed to provide the best quality and value that the customers expect. The product uses different species of naturally produced fruits to provide each customer with a seamless customer experience. The vision is to become the best choice of healthy breakfast in the area, and become a respected seller from the customer's point of view.



3. The Project

- The proposed project is that of setting up of a production unit of muesli in Mr. Hekkert's farm.
- The key elements of the proposed project are as follows:
 - ♣ Organic dry fruits and ♣ rolled oats
- For a dried fruit muesli product, the process of drying fruit is of importance. We propose the method of a dehydrator heating element that warms the food causing its moisture to be released from its interior. The appliance's fan then blows the warm, moist air out of the appliance via the air vents.
- The proposed project would procure the raw materials from the own farm. After processing, the products would be mainly supplied to local consumers or sold at the local market.

4.1 Product:

Hekkert's interest is focusing on **Muesli** as main alternative product than just selling fresh fruits.

Why **Muesli**?

1. It is natural and healthy.
2. Relatively easy to produce, process and store compared to other products.
3. Demand is good for organic muesli compared to other competitive products processed from fruits like jams and jellies.
4. Easy to market when compared to the others.
5. Directly from Farm to customer.

4.2 Present Fruit Production situation:

1. Current land use of six hectares.
2. Current total number of apple and pear fruit trees in orchard are 188 and 122 respectively.
3. Current total potential fruit production of apples and pears is 28,388 and 11,224 fruits respectively.
4. Current total potential fruit production of apples and pears is 5,419 kilograms.



4. Market prospects

The area where the farmer wants to start his business is in a village called Terwolde, in the municipality of Voorst, in the Dutch province of Gelderland. The village is located on the left bank of the IJssel, about 4 km downstream from Deventer, a city and municipality in the Salland region of the province of Overijssel, The Netherlands. In 2017, Deventer had a population of 99,577. The city is situated on the east bank of the river IJssel. With five food markets taking place per week in Deventer, the farmer can potentially sell his product here owing to its proximity to his orchards. It may be noted that Deventer market, which is a market was judged as the best medium-sized market in the Netherlands in 2014.

Terwolde, including rural areas with exception of the neighbouring De Vecht, has 2,190 inhabitants. In the outskirts of the village, near the neighbourhood De Wijk is the Ooievaar flour mill, close to Hekkert's location, where they sell similar products, there may be a possibility of selling his products. With continued growth in the area, opportunities to serve the local residents will increase.

The farmer will most likely sell to individuals, B&B's/small hotels or maybe also local retail stores. Occasional farm festivals are celebrated on his orchard which offers as a venue to sell his products to individuals and families of the area. All in all the main market segments are:

- Local individuals and families.
- Selling in off premises or at farmer's markets.
- Supplying to small Hotels and B&B's which, in terms of purchase orders, typically make larger orders for their customers but will fetch a lower price.

However, the first two market segments are preferred and will account for more than 90% of sales to avoid reseller costs.

Natural foods have been popularized very rapidly and are on high demand, especially, for agricultural products like fruits, vegetables, cereals, pulses and other food materials. Natural farming is considered by the targeted consumers as a preferable method of agriculture than chemical based agriculture because it retains the health of soil as well as maintains environmental equilibrium besides yielding qualitative agricultural produces.

Muesli is a fibre-packed, nutrient-rich yet convenient breakfast and snack which, unfortunately, has always been underrated. As it provides healthy, nutritious food to the customers muesli fits right in well.

Strategy

Our strategy is based on selling a strong customer value proposition in a niche market. The farmer is interested in offering the local people and those living and visiting in the surrounding areas a genuine and healthy product. Therefore, it is imperative that he should build a good market infrastructure so that he can reach his customers both in his village and the surrounding areas with the same offer. He should focus on interesting residents and B&B's and small hotels located nearby. Having said that, volumes produced are limited to this set-up, so for now he can start with existing clients on premise and potentially one or two B&B's to try out the product in



the market.



5. Fruit processing

Peeling and Slicing:

Leaving the peel, adds a little flavour to the dried apples and pears and increases the fibre content making them good agents for loss of weight. However, in some cases, the peel gets really hard like a plastic coating and becomes uncomfortable to chew.

(Reference: **Ashurst**, Philip R., **Arthey**, David, 2001, Fruit processing nutrition, products and quality management, HAS Hogeschool.)

Peeling, slicing and coring can be done in two ways.

- With help of manual labour and a small handy peeler which is used for both apples and pears, mainly used for slicing coring and peeling. Mr. Ralph Mulders (a farmer in Nijverdal) is selling the peeler for EUR 27.50.
- With the help of an electric peeler. This machine is multifunctional –it can do peeling coring and slicing of apples and pears. The machine is made of high quality stainless steel, small and easy to operate, just one person can handle this. The machine which including peeling knives, coring knives and slicing knives which costs around EUR 800 to EUR 3,500, depending on its capacity (refer to the appendix for the machines).

| Electric peeler | | | Manual peeling cost | |
|---------------------------|--------------------|--------|------------------------------------|-----------|
| price range | 800 to 3,500 Euros | | labour cost per day | 40 |
| peeling speed(piece/hour) | 600 to 700 | 360 | fresh fruits dried in one day (kg) | 30 |
| peeling capacity | 1 to 3 ton /day | | fresh fruits (kg) | 5,419 |
| motor power | 0.15kw | 0.55kw | days required to dry all fruits | 181 |
| power supply | 380watts, 50 hz | 220v | Labour cost(Euros) | € 7225.65 |

Table 1: Comparison electric and manual peeling

1) Drying :

After discussing with Mr. Hekkert about various drying methods or dehydrating the fruit, it was concluded that the hot air drying is the most suitable for his conditions. A hot air food dehydrator has an electric element for heating and a fan and vents for air circulation so air is circulated over the product trays inside the dryer. The hot air is used to evaporate water out of the product that needs to be dried. Therefore, the temperature of the air decreases and its humidity increases. Dehydrators are efficiently designed to dry foods quickly at 140° F (60° C) (The appendix provides an overview of various drying machines).



2) Rolling of Oats by flour mill:

Oat has a hard, inedible outer husk that must be removed before the grain can be eaten. After the outer chaff has been removed from the bran-covered oat grains, the remainder is called oat groats. Since the bran layer, though nutritious, makes the grains tough to chew and contains an enzyme that can cause the oats to go rancid. Raw oat groats are often further steam-treated to soften them for a quicker cooking time (quick oats) and to denature the enzymes for a longer shelf life.

To avoid this complicated process, we suggest the farmer to use naked oats. Naked, or hull-less oats (*Avena nuda*) are a high quality oat that lose their husk naturally during the normal harvesting and threshing process. As the husk is discarded, nothing but the highly nutritious oat kernel is left. This crop has not been cultivated widely because of its assumed lower yield compared to standard commercial oat crops. The yield of naked oat cultivars is generally 70-80% of husked varieties. However, the indigestible husks of hulled oats are included in this yield and account for up to 25% of the weight of the grain. Taking this into account, the kernel yields are actually comparable. With the naked oats, the husks do not need to be transported and processed with specialized machinery - a process which also reduces their nutritional quality. For the small cultivator it makes more sense since they do not require the expensive machinery required to process normal oats. Naked oats are the perfect choice, if you want to roll your own oats. It is the husk on other varieties of oats which makes it easy for sending them directly to mill without any pre-treatment.

Nutritional benefits of naked oats

- High Oil contents leads to a much higher level of unsaturated fats than any other cereals. In particular, the very high linoleic acid content (33-46% of total Fatty Acids) makes it a particularly healthy food for humans.
- Total fibre and digestible fibre content is high, making Naked Oats a very healthy food.
- High content of natural anti-oxidants is very useful against heart diseases.
- Low starch levels shown to have reduced toxicity for celiac patients.
- Protein content (16- 20%) and quality of protein are excellent (very high globulin fraction)

(Reference: Elsevier, 2017 scientific database recently released genotypes of naked oat (*Avena nuda* L.)

3) Mixing of muesli: Mixing of muesli can be done in two ways –

- 1) Can be mixed manually basing on the percentage of dry fruits needed in the product while packing and
- 2) mixing with a Lab mixer. The lab mixer helps to get a homogeneous mixture without breakage but suitable for huge quantities. Only 30% of oats produced is used in muesli and the other 70% can be sold for porridge.

4) Packaging:



Bio degradable packages of 250 g are printed with ingredients and logo by the packaging supplier and the farmer will pack the blended muesli product manually and seal it.

6. Value chain

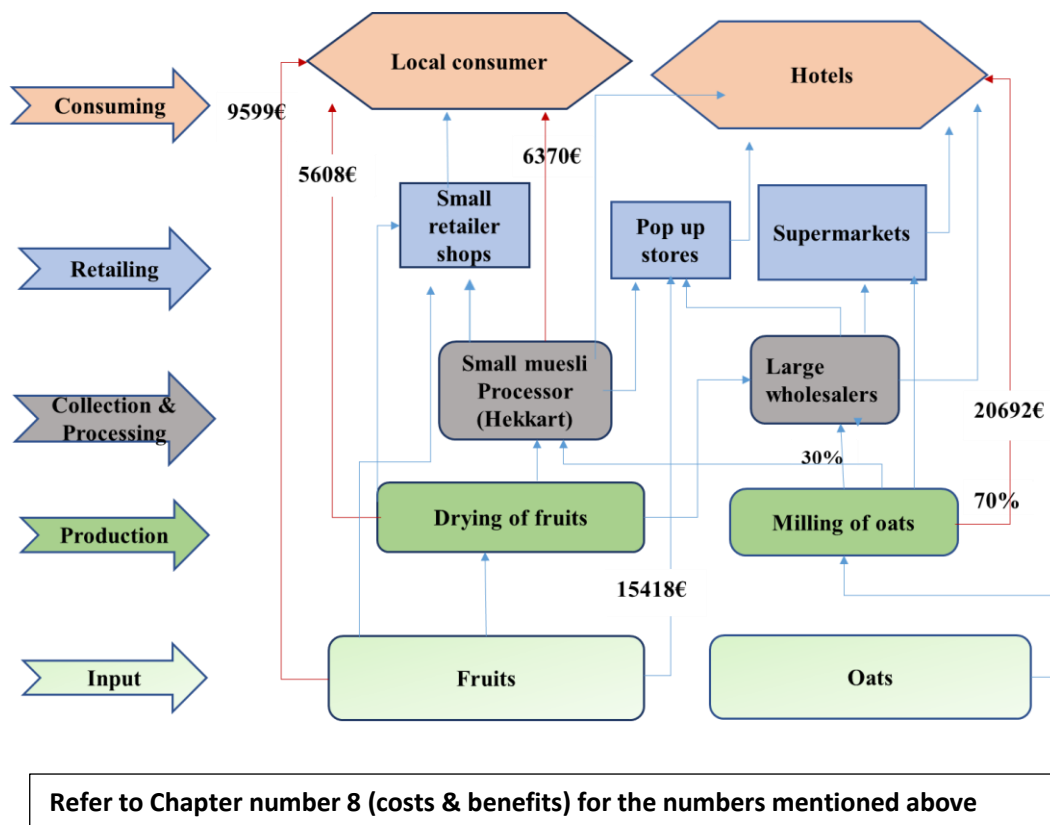


Figure 2. Value Chain for Muesli and Oat production

We compared 3 different product-market combinations, namely

- 1) Situation as is: selling fresh fruit products to end users directly
- 2) Selling fresh fruits – like situation [1] but at higher prices
- 3) Selling dried fruits to end users directly
- 4) Produce a muesli from the (dried) fruits and oats and
- 5) Selling oats separately.

It turned out that if all fresh fruits are actually grade 1 and sold at high-end prices, this alternative will be more attractive than producing muesli, in terms of (a) higher net income, the farmer can consider a price rise of EUR 1.00 comparing market prices for his pesticide-free fruits, which gives EUR 15,418 revenues instead of EUR 9,599. (See Chapter 8) and (b) less labour-time consuming. However should the fresh fruits not be (all) grade 1, than lower sales-prices will result in significantly lesser income (25%-50% less). That said, should all be grade 1, it is expected the farmer can regularly sell fresh fruits at a higher price at, e.g. farmer markets, on the grounds of being a pesticide-free and local natural product. This can boost net income to EUR 15,400 versus the EUR 9,500 base case.



Next, it was investigated whether a dried fruit product would generate more income. Results show that this is relatively costlier when compared to the production output (dried fruit have much less weight, not compensated in the price), so unless this is done on a much larger scale, this option will be less attractive.

As a forth option, production of a bio-muesli 250 g mixed bags (25% fruit, 75% oats) was analysed. The outcome for this is that this potentially (using all the fruits) could generate relatively good net income, namely EUR 6,400 for the muesli (25% fruits and 75% oats) and estimated revenues from the remaining oats up to EUR 20,600 as separate by-product as not all oats grown are used for muesli. However, it should be noted that this process will (a) be more time consuming to produce and (2) involves the risk of setting up distribution towards end-users, which may take start-up time to develop a market.

Therefore, we believe the muesli option could be an interesting path, however only if the farmer is inclined to produce larger volumes of fruits and oats in future: right now, the volumes are somewhat low to justify the investment in time and market development. At a larger volume, i.e. selling more muesli packets than currently possible with the current fruit-harvest, can make this an attractive product for the farmer to produce.

Last but not least, given the high nutritional value of naked oats, the farmer could also think about just selling oats directly along with the fresh fruits he is already selling to customers at his premises. With production costs close to 1 cent per kilo, with 5000 kg production which is left after muesli production, naked oats could be sold at EUR 4 per Kg which could boost revenues up to EUR 20,600.

All in all it looks like the farmer, when exploring alternative business opportunities, will practically be better off by continuing as is (selling fresh fruits directly to consumers) unless he feels pricing will further decline for this market. As an alternative he could additionally grow naked oats and sell those to consumers next to the fresh fruits, which would be a good extra alternative source of income. Once he has this combination (fresh fruit sales and naked oats sales) running, he can start to make small numbers of packaged (250g) dried fruit and oats and sell these samples of pesticide-free healthy breakfast muesli to his regular customers and potentially to bed & breakfast clients. If it turns out that this is a success, a product that clients like and appreciate, he could consider a scale up and eventually decide to produce this product, because it is clear from our investigation that this product is only beneficial for the entrepreneur if larger volumes are produced and sold than they are done with the current fruit harvest. Based on these insights, in the future, the farmer could make better informed estimates of his business strategy.

7. Business Model

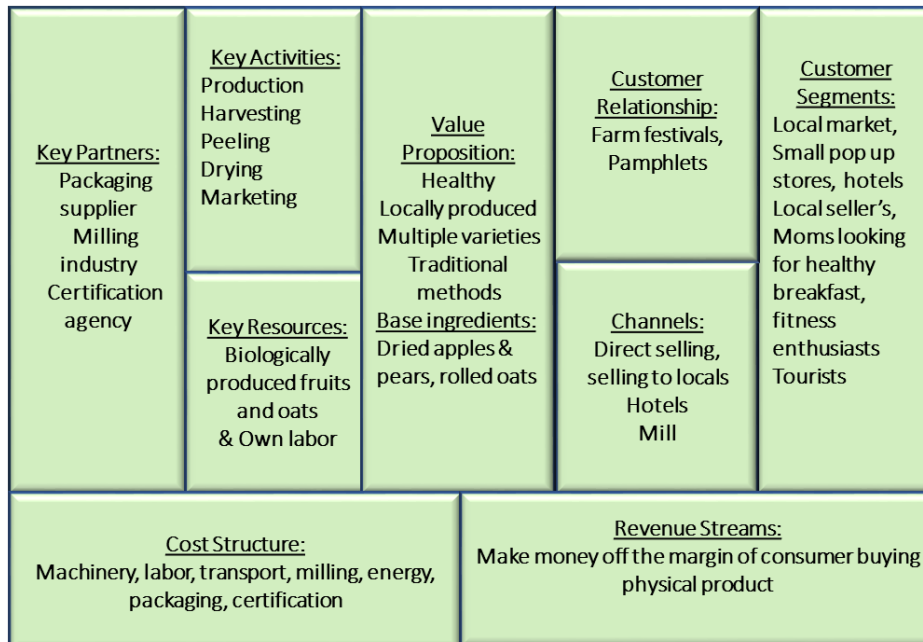


Figure 3. Business Model canvas Muesli and Oats

1) Key partners

The network of suppliers and partners that make the business model work for a small processing unit with minimum labour input, as it is difficult to do every activity by himself. Main key partners are the milling industry for rolling of oats and a packaging supplier for providing material for packing the final produce.

- Packaging supplier: To supply small packets of 250 grams with ingredients printed on it for packing the final muesli product. Cost of one packaging unit is EUR 0.12.
- Milling industry: Rolled oats cook faster than steel-cut oats, absorb more liquid, and hold their shape relatively well during cooking. The Havekes Mölle in Twello municipality of Voorst is the nearest windmill run mill in Twello close to Hekkert's location.
- Certification agency: Certification may result in a bio-certificate with a positive assessment that guarantees the biologically certified business activity. Certification is done by the controlling authority SKAL Biocontrol (see for further information: <https://www.skal.nl/>), which is dedicated to proving the reliability of organic products in The Netherlands. SKAL finances this supervision through an initial one time registration fee of EUR 700 and yearly subscription fees of EUR 300 if the farm is completely organic, or if not, EUR 1000 depending on the farm and annual inspection fee and other fees.



2) Key Activities

- a) Production: Pesticide free fruits produced in six hectares (about 600 trees) of orchard and naked oats on one hectare on the own farm.
- b) Harvesting: During the season all the mature fruits will be collected manually from the six hectares of orchard and naked oats are mechanically harvested during both seasons (spring and winter) from one hectare of land.
- c) Peeling (if required) & slicing: Removing the outer peel of both apple and pear is done with a small iron peeler or large electric peeler depending on labour availability. Both machines can peel, slice and core.
- d) Milling: Harvested oats are transported to the mill to be made ready for muesli which are flaked to thickness of 22's for instant or quick Cook smooth porridge.
- e) Mixing & Packaging: The final muesli product is manually mixed in required portions with dry fruits and sealed in 250 grams packets, at the farm or the mill.
- f) Marketing: The muesli and naked oats are sold locally where consumers are made aware and informed about the 'story of the products. Environmental friendly pesticide free, local production is a positive point while marketing.

3) Key Resources

Orchard of six hectares and farm land of one hectare of naked oats are the key physical resources. The old barn is used for placing the machines. Human resources include either a small work force or his own personal labour. The farmer will need 181 days to dry the potential production of fresh apples and pears.

4) Value Proposition:

- a) Healthy food: As both the fruits and oats are cultivated through environmental friendly methods they tend to be more nutritious.
- b) Local Produced: As the product is locally produced it has potential for food safety and transparency to customers. The farmer can add his story connected to his produce in website or with the help of pamphlets for gaining trust of customers.
- c) Multiple Varieties: The farmer has different ancient varieties of apples and pears which increase variety size of the product.
- d) Traditional methods: The farmer is following traditional methods of cultivation in which trees are allowed to grow naturally without causing any damage to nature.

5) Customer Relationship

A good personal relation with customer is important. As Hekkert sales are mainly in the neighbourhood, a fair price and a good product will help him in promoting mouth to mouth publicity.

- a) Farm festivals: Celebrating apple days or fall harvest festivals on weekends when the farmer has a fresh harvest of fruits, by inviting customers to his orchard and introducing them to the new products that the farmer started manufacturing at his place.



- b) Pamphlets: A printed sheet of paper containing information about products and distributed free to customers/consumers.
- c) Internet: The farmer can create his own website or can use social media with a few pictures of his orchard and also show seasonal offers on the products, information on farm festivals etc..

6) Channels:

- a) Direct selling: For the consumers this is an alternative to retail stores, and a cost effective way of buying as charges for bringing products to the market are avoided.
- b) B&B's and Hotels: Many B&B's and hotels offer a lighter breakfast as it is more economical and easy to provide. Muesli can easily fit in there.
- c) Mill: There is a windmill in Twello, close to Heckert's location where they are selling similar products, so the farmer could sell his produce via this outlet as well.

7) Segments:

- a) People looking for healthy food: The farmer can consider the people who look for healthy food as his main customer segment since they are easily attracted to this kind of products, for example parents looking for easy and healthy breakfast options or fitness enthusiasts.
- b) Local market: selling the product in local food markets will increase the product rating when potential customers perform local searches. The interactive marketing in local businesses will provide a marketing advantage and attract more customers.
- c) Small organic stores: Organic consumers always look for special stores which sell only organic products.
- d) Pop up stores: Opening short term stores saves expenditure. It is cost saving to open a short-term store. There can be high-impact while simultaneously being cost-effective.
- e) Local B&B's and hotels: most B&B's and hotels have muesli on their breakfast menus. They are always willing to purchase locally produced muesli because of reliable quality, low price and an appealing story.
- f) Advertising hoardings: They play an important role for both farmer and consumer. Outdoor (for example around the farm) advertising can deliver a relevant message to the targeted people with ease and efficiency.

8) Cost Structure

The major components of cost structure are variable costs (production costs of oats and fruits) at EURO 2,548 and fixed costs at EURO 266 per year and overhead costs which are negligible for Heckert's conditions.

9) Revenue Streams

A revenue of EUR 6,370 can be generated, if muesli is sold at EUR 3.00 per serving of 250 grams which contains 25% dry fruits and 75% oats and the profit varies with the margin of the product. (Refer chapter 8 (costs & benefits) for the figures)



8. Costs and benefits

Present potential revenue:

| Projected revenues based on present situation fruit orchard | | | | | | | | | |
|---|---------------------|-----------------|------------------------------------|------------------------|----------------------------------|----------------------------------|---------------------|---|---|
| Product | Price per unit(kgs) | Number of trees | Potential yield per tree (#fruits) | Total number of fruits | Average number of #fruits per kg | Total production on fruits (kgs) | Revenue from fruits | Total dry fruit production in kgs 90% reduction | Total dry fruit production in kgs 70% reduction |
| Apples | € 1.50 | 188 | 151 | 28388 | 8 | 3548.5 | € 5,322.75 | 354.85 | 506.9285714 |
| Pears | € 2.50 | 122 | 92 | 11224 | 6 | 1870.666667 | € 4,676.67 | 93.533333 | 561.2 |
| Walnuts | € 1.50 | 253 | 80 | 20240 | 120 | 168.6666667 | € 253.00 | | |
| Prunes | € 2.50 | 29 | 30 | 870 | 18 | 48.33333333 | € 120.83 | | |
| Forestry subsidy* | € 1,600.00 | 6 | | | | | € 0.00 | | |
| Total | | | 353 | 60722 | | | 10,373.25 € | 448.38 | 1068.13 |

Table 2. Potential revenues present situation

| | | |
|---|---------------|---------------|
| Potential Revenues & Income from apples and pears (fresh) | 5,419.17 € | 5,399.17 € |
| | 90% REDUCTION | 70% REDUCTION |
| Potential revenues from apples and pears (dried) | € 9,999.42 | € 448.38 |
| Potential Income from apples and pears (dried) | € 9,966.92 | € 415.88 |

Table 3. Comparison potential revenues fresh and dried fruits



| Variable cost fresh produce | |
|-----------------------------|----------------------------|
| Fruits | Total annual costs in Euro |
| 1) labour | € 400.00 |
| 2) materials | € 0.00 |
| Winter oats | |
| 1) labour | € 0.00 |
| 2) materials | € 388.00 |
| 3) Hire machinery | € 324.00 |
| Spring oats | |
| 1) labour | € 0.00 |
| 2) materials | € 352.00 |
| 3) Hire machinery | € 324.00 |
| | |
| Transport | € 10.00 |
| Packaging | € 430.45 |
| Power consumption | € 89.68 |
| Milling of oats | € 80.00 |
| Machinery | € 150.00 |
| Total | € 2,548.12 |

Table 4. Variable costs processing

Fixed costs:

| Fixed costs (Euro) | | | |
|--------------------|------------|--------------------|-----------------|
| | Price | depreciation years | price per year |
| Dryer | 1,500.00 € | 15 | 100.00 € |
| Peeler | 1,500.00 € | 15 | 100.00 € |
| Sealing machine | 1,000.00 € | 15 | 66.67 € |
| | 0 | | |
| Total | | | 266.67 € |

Table 5. Fixed costs processing



Investment Plan

| Investment Plan | |
|------------------------|-------------------|
| FRUIT Dryer | € 1,500.00 |
| PACKING AND WEIGHINING | € 50.00 |
| PEELER | € 1,500.00 |
| BUILDING RENOVATION | € - |
| Sealing machine | 1,000.00 € |
| Total | € 4,050.00 |

Table 6. Investment plan

Return on Investment

| | | | | |
|--|-------------------|---------|-------------------------------|-------------|
| TOTAL COSTS | € 2,814.79 | | | |
| For 3.600 packaged servings of 250gr of oats + fruits (50%) | | | | |
| For 7.200 packaged servings of 250gr of oats + fruits (25%) | | | | |
| Cost price per unit | € 0.78 | 250 g | grams (50% fruit) | |
| Cost price per unit | € 0.39 | 250 g | grams (25% fruits) | |
| Remark: Seems very cheap , however at this low volume no costs included for e.g. land (lease) , barn (lease) and other overhead / more machinery When the volume would increase there will be better return on investment. | | | | |
| Market prices (currently in stores) | (1) | € 2.00 | 450 | Grams |
| | (2) | € 3.00 | | |
| Market prices (currently in stores) | (3) | € 1.11 | 250 | Gram |
| | (4) | € 1.67 | | |
| Margin | (3) | € 0.33 | 250 grams | 42% |
| | (4) | € 0.88 | | 113% |
| Total net profit | (3a) | € 1,185 | For 3600 servings (50% fruit) | sale 2 euro |
| | (4a) | € 3,185 | For 3600 servings (50% fruit) | sale 3 euro |



| | | | | |
|--|------|------------|-------------------------------|-------------|
| | (3b) | € 2,370.42 | For 7200 servings (25% fruit) | sale 2 euro |
| | (4b) | € 6,370.42 | For 7200 servings (25% fruit) | sale 3 euro |

Table 7. Return on investment



9. Discussion and recommendations

The farmer is interested in producing augmented product that has a unique advantage in the market besides being biological, having long storage life and health-assuring. To some extent, natural production has a better acceptance than its competing products. As natural or locally produced food is often viewed as healthier and tastier, consumers are willing to pay more for this product.

As the fruit production is not so high at the moment, enhancing the revenues will require a lot more effort in the sense that the production should take off in a much bigger way.

Hekkert can gain more profit, if he can sell the present fresh produce at a market price or organic price, especially, prunes and walnuts.

| Comparison of Sale price | Prunes | Walnuts |
|---------------------------------|----------|------------|
| Potential production (kgs) | 48.33 | 168.67 |
| Last year selling price | € 2.50 | € 1.50 |
| Revenue generated last year | €120.8 | € 253.00 |
| Market price | € 7.00 | € 6.00 |
| Revenue if sold at market price | € 338.33 | € 1,012.00 |

Table 8. Potential revenues prunes and walnuts

Our research shows that the farmer, when exploring alternative business opportunities, will practically be better off, as stated earlier by continuing as he has been doing (selling fresh fruits directly to consumers, if major fruits are of good grade) unless he feels pricing will further decline for this market. As an alternative, he can grow naked oats and sell those to consumers next to fresh fruits, which will be a good alternative source of income. Once he has this combination (fresh fruit sales and naked oats sales) running, he can start to make small numbers of packaged (250g) dried fruit and oats and sell these samples of pesticide-free healthy breakfast muesli to his regular customers and potential bed & breakfast lines, or can make muesli mixes based on customer's preferred choice, as Hekkert has different types of fruits and nuts. He can mix different bio muesli with unique ratio of fruits of customer's favourite natural pesticide free ingredients.

If it turns out that, that clients like and appreciate his mixes, he can scale up the production and decide to grow this product. It is clear from our investigation that this product is only beneficial, if larger volumes are produced and sold than they are at present. After some experiences, the farmer can make better calculations and determine a business strategy.

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11. Appendix



Figure 4 Apple peeler manual table clamp: This small peeler made of iron, with clamp-fixing can be used for apples, pears and also other hard fruits, is available at de Landman drying unit.



Figure 5 Drying cupboard at De Landman drying unit


This Huge cupboard is bought by Mr. Ralph Mulders for EURO 2500 and he made the drying motor inside which helps to recycle hot air. This dehydrator is very good at energy saving. It takes 24 hours to dry a batch of apples or pears.




Figure 6 Small drying machine at De Landman drying unit


This small Swiss made fruit dehydrator with 3 trays costs from EUR 135 to EUR 160 which can generate hot air flow up to 70 °C. There are two switches to control temperature and time of drying. The trays are detachable and their number can be increased.

Overview of drying machines

| Type of dehydrating method | Electricity consumption | Advantages | Dis-advantages | Cost | Capacity |
|---|-------------------------|--|---|--|---|
| <p>1) Solar drying</p>  <p>https://www.nda.agric.za/docs/solar/solardrying.htm</p> | - | <ul style="list-style-type: none"> • Less energy consumption • easy adjusting of drying temperature • Drying is faster because inside the dryer it is warmer than outside • easy to unload and clean It is labour saving • Less risk of spoilage • The quality of the product is better in terms of nutrients, hygiene and colour. | <ul style="list-style-type: none"> • may cause fuel dependence sometimes • more complex structure • low thermal efficiency | 1000 to 1500 euros depends on construction | can dry 300kgs but varies with type of construction |



| Type of dehydrating method | Electricity consumption | Advantages | Disadvantages | Cost | Capacity |
|--|-------------------------|--|--|--------------------|--------------|
| <p>2) Hot air drying/ Food dehydrator</p>  <p>https://pdfs.semanticscholar.org/dfc5/655c1839dec9a1272aa03f53ba257668cbc0.pdf</p> <p>https://meatballly.com/fruit-dehydrator-special-appliances-for-home-kitchen/</p> | 500 to 700 watts | <ul style="list-style-type: none"> Increases drying rate of high temperature dryer by about 300 percent all slices have the same MC simple equipment operation occupies less space Good taste Compact and Smaller In Size Stackable Trays Mean You Can Add More Trays If You Need | <ul style="list-style-type: none"> Requires natural air/low temperature drying to complete drying long drying time risk of varying product quality The exposure to air and light can bring about rancidity of the fat. | 1000 to 2000 Euros | 30 to 100kgs |

| Type of dehydrating method | Electricity consumption | Advantages | Disadvantages | Cost | Capacity |
|--|-------------------------|---|---|--------------------------|---------------------------|
| <p>3)Oven-drying method</p>  <p>https://preserveandpickle.com/dehydrator-vs-oven-drying/</p> | 1000 to 5000 watts | <ul style="list-style-type: none"> • large number of samples at same time • large sample volumes possible • high accuracy • materials are dried evenly • automatic temperature control • easy installation and maintenance • stainless steel constructed - highly durable • low noise • large number of samples at same time | <ul style="list-style-type: none"> • large sample volumes possible • high accuracy • materials are dried evenly • automatic temperature control • low noise • stainless steel constructed - highly durable • easy installation and maintenance | 2500 Euros to 3000 Euros | 30kgs to 100kgs per batch |