Yearly Report "Ancient Wheat" 2015

Report to Ekhagastiftelsen for project:

Research into health effects of ancient wheat species varieties compared to modern wheat varieties (Dnr:2014-64)

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Aim and background

The exclusion of grain from the daily diet is growing among the western population. One of reasons could be the hype among people believing a grain free diet is healthier than a grain containing diet. Another reason for people to eliminate grain is because of certain specific complaints they experience when consuming grain contain products. Irritable bowel syndrome is a chronic condition which is characterized by abdominal discomfort or pain, altered bowel habits, often bloating and abdominal distention. Two out of three IBS patients associate their symptoms with the consumption of certain food products such as dairy products or wheat products. These symptoms and complaints could be a reason for people to stop consuming certain grains and its products or switch to consume different grain variety.

The Objectives of our proposal are:

1) Inventory and understanding which reasons people have (with or without specific complaints) consuming various products from ancient wheat varieties in the Netherlands. Insight in possible health effects in the following target groups (healthy subjects and patients with IBS) and their experiences. Focus will lay on the possible differences between people consuming emmer wheat or spelt wheat.

2) To map information about the scale and infrastructure ancient wheat varieties grown, produced and processed in the Netherlands. Focus will lay on emmer wheat and spelt wheat and how this knowledge could be used in a dietary intervention concerning ancient compared to modern wheat varieties. Comparative study of the constituents of different wheat species.

3) To develop a diet intervention program based on ancient wheat in close collaboration with the Dutch Organisation for IBS patients and organic bakeries. This is regarded as an essential step not only to ensure that the diet intervention is in line with positive experiences of patients, but also to facilitate dissemination and implementation of the final study results into daily practice and life of IBS patients. Gathering specific data on the feasibility of such a diet intervention in subjects with Irritable Bowel Syndrome. Among others, recruitment success, motivation and compliance of participants and implementation of telephone counselling will be investigated.

4) To perform a 4-week randomized controlled, cross-over study to compare health effects and laboratory parameters of a diet intervention program based on ancient wheat varieties and modern wheat varieties based on the guidelines for a healthy diet on parameters of IBS.

Progress and activities during the last year

Objective 1

Questionnaires

By using a questionnaire, participants were asked about their experience with different wheat species and whether they have any health or physical related complaints when consuming them. Furthermore, evaluating what the reasons were to stop or switch to consume a certain wheat variety and whether this led to a change in health related complaints and symptoms. " Meer Weten van Mensen en Markten" (MWM2) has been used as an online tool for structured marketing and research. The questionnaires have been evaluated over a period of 8 weeks in different locations close to Driebergen (such as a bakery, supermarket and organic food store) with consumers.

Secondly, the questionnaire link was published on the website of the Dutch Organization for IBS patients. There was also a press release and the research link had been published on different websites such as bakkerswereld.nl and veeteelt.nl. The research link was also shared on social media (Facebook and Twitter).

The total duration of the registration of the questionnaire took up to 7 weeks. The results of the questionnaires have provided information on the possible observed health effects of the various grain products in healthy subjects and people with chronic abdominal complaints.

Statistical analyses

The results have been processed by using the correct statistical analyses using SPSS version 21. The complaints, diagnose and treatment the participants reported were divided into different groups. Descriptive statistic and frequency statistic was used to provide insight into the results often with selected data. For example; a selection of participants with complaints or participants with IBS. The one way Anova test was used to provide insight in possible significant difference in health scores between the participant with and without complaints. A P value ≤ 0.05 was considered to indicate statistical significance.

Results

156 of the 356 participants experienced health related complaints when consuming a wheat specie. The most frequent reported complaints were; stomach-ache, bloating and tiredness. The most reported wheat species that was associated with the discomfort seems to be common wheat (Triticum aestivum) as 57(37%) eliminated this specie. (42) 27% of the participants who experience complaints switched to consume spelt (Triticum spelta). Participants experiencing complaints when consuming a certain wheat species, give themselves a significant lower health quantification (6.8) than participant who do not experience any pain (7.7). Participants with IBS gave themselves a 6.3 as health quantification.

12% of the participants had an official IBS diagnose. 65% of the participants with complaints were not diagnosed.

This research shows an improvement of reported health related complaints after the participants changed and/or eliminated a wheat species. Of the 42 participants with complaints who switched to consume spelt, 30 reported an improvement in their health complaints.

Objective 2:

Ancient wheat varieties

Next to the commonly grown soft (bread) wheat, three species of wheat are cultivated in the Netherlands. These are, in the order of importance: Spelt, emmer and einkorn. Some of the reasons for their limited cultivation are low yield, tendency for lodging and the need of dehulling. Another factor is likely also their lack of adaptation to modern baking processes, and particularly in the case of emmer and einkorn late ripening and lack of responsiveness to nitrogen fertilizer. Farmers who want to cultivated these species successfully need to have their own storage and drying facilities, and ideally also cleaning and harvesting equipment.

The last few years the cultivation of spelt wheat has seen a clear increase. This is exemplified by the fact that certified seed is sold on the market, and that in the case of organic farming, farmers have to use organically multiplied seeds. Although still a niche, the cultivation of spelt wheat is gradually becoming part of mainstream farming. It is not only cultivated by organic farmers, but also by conventional farmers. Two varieties of spelt are most commonly grown: Franckenkorn and Oberkulmer rotkorn. Frankenkorn is the result of a cross between spelt and soft wheat and has a higher yield compared to Oberkulmer rotkorn. Oberkulmer rotkorn is said to be one of the real 'pure'spelt varieties (next to Ebner rotkorn). Whether, and to what extent, Oberkulmer rotkorn can be more easily digested compared to Franckenkorn is not clear.

Emmer and einkorn are only cultivated by a few farmers in the Netherlands. Compared to spelt these two species have lower yield, and ripen later, which increases the risk of harvesting for the farmer. Of emmer, two varieties are known to have been cultivated in the Netherlands: white and red emmer. Of einkorn only one variety is known to be grown in the Netherlands. Likely less than ten farmers are cultivating these two species in the Netherlands. The organic farmer Piet van Zanten seems to play an important role in the cultivation and distribution of seed to other farmers, both organic and conventional. To exemplify the status of emmer and einkorn as crops is that no certified seed is sold on the market, and that organic farmers can use non-treated conventional seed.

In addition to emmer and spelt, a few farmers have an interest in cultivating landraces and old varieties of soft wheat. These varieties are typically lower in yield compared to modern varieties. In terms of baking quality they are more similar to spelt than to modern wheat varieties. The protein quality of the landraces and old varieties of soft wheat are similar to that of spelt, shown by the low values for Zeleny sedimentation (Table 1).

Table 1:

variety type	species	breeding intensity	# acces-sions	Zeleny	protein % dry matter	gluten index (%)	wet gluten (%)
Year of analysis: 2015							
landrace	emmer	none	1	16,0	13,6	61,3	28,9
landrace	spelt	none	1	16,0	10,6	75,0	23,2
old variety	spelt	little	1	17,0	14,2	45,2	39,6
landrace	winter wheat	none	2	<10	10,9	86,5	18,6
old variety	winter wheat	little	1	<10	9,4	62,7	19,2
variety (modern)	winter wheat	high	1	27,0	14,5	67,3	30,5
population (modern)	spring wheat	high	2	41,3	11,6	98,0	24,3
Year of analysis: 2011							
landrace	winter wheat	none	10	14,3	12,1		
old variety	winter wheat	little	3	10,7	11,1		
variety (modern)	winter wheat	high	1	43,0	10,9		
population (modern)	winter wheat	high	1	50,0	12,9		
Year of analysis: 2010							
old variety	spelt	little	5	18,4	12,9		
old variety	winter wheat	little	1	12,0	11,7		
variety (modern)	winter wheat	high	1	58,0	13,0		

Aims and plan for the coming year(s)

We can conclude that participants experience health related complaints when consuming certain grains. And so, the consumption of certain grain species seems to be symptom driven. As those who experience complaints suggest a low health quantification, a decrease in complaints would be desired. Therefore our aim for the coming years is to succeed with objectives 3 and 4 as planned and

specified in our proposal. With the results from the objectives 1 and 2, a specified protocol of a dietary intervention will be designed using most likely a cross-over model with modern and ancient wheat based products. This protocol is currently under development. The final objective consists of performing a 4-week diet intervention study. Depending on the specified protocol from objective 3 , the study will be performed and all relevant data for analysis will be obtained. Based on the results of objective 1 and 2 we are now planning to include spelt as a main ancient grain species in the following steps since 72% of the participants started consuming spelt reported an improvement in health related complaints. Their experiences and possible health-related complaints (physical and non-physical) will be recorded and monitored. The results of this study will be published no later than December 2017.

Financial overview

Budget 2014-2017:

Total 125.438 euro (1.158.200 SEK)

Expenses till December 2015:

Total project expenses	Activity
€ 34.326	**Personnel Costs (incl Inventory)**.
€ 857	Additional costs (incl. Mailings/communications, travel expenses)

Total full project
35.183 euro

Remaining budget: : € 90.255

According to plan, the remaining budget will be used for the project objective 3 and 4 in 2016 and 2017.

Driebergen, April 25th 2016

Inge Boers, MD