The Meat Dogma Project: Exploring Nitrogen Mitigation in Denmark

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Abstract: *Reduction of meat consumption in the modern West is often stymied by a meat-dominated tradition. While many people today are aware of the importance of reducing our carbon footprint, far fewer understand the harmful effects of nitrogen (N) pollution, or how large an impact the production and consumption of meat has in this issue. Publication of relevant studies, strategies and discussions is needed. Our research analyzes both methodologies and social themes which are pertinent for developing custom-based strategies aimed at reducing the current level of meat usage in Denmark, a country with a high production meat industry and heavy meat consumption per capita. Along with our qualitative research, we are utilizing quantitative calculations of N-Footprint size in terms of food consumption. We conclude by discussing certain strategies which with broader implementation could result in a more sustainable consumption as a norm.*

Keywords*: meat consumption, commensality, diet, daycare, nitrogen footprint, sustainability, narratives*

1. Introduction

Meat consumption in most countries in the modern Western world has increased dramatically since the postwar period of the 1940's (Howarth et al. 2002; Galloway et al. 2007). Economic and social development have brought a greater purchase power to more individuals in modern societies, while specialization and industrial intensification have at the same time made meat products cheaper and more accessible (Moss, 2013). The industrial production of meat and dairy products requires a high level of nitrogen (N) input through fertilizer application, N-rich fodder production and transport, and waste products (Steinfeld and Wassenaar, 2007). All of these factors result in an imbalance of N compounds in the environment (Galloway et al. 2008; Reay et al. 2011). While other related issues are of equal concern, this article has as its starting point the direct impact of N mitigation on health and environmental issues in the area of food consumption. In this extremely complicated field of research, our focus on meat reduction makes more discernible 'the significance of socioeconomic factors' involved (Niva et al. 2014: 478). We argue that N mitigation through diminished meat consumption must be included in the discussion of a more sustainable future. The vital role meat plays in the social dietary norms of most European countries is a major barrier in finding a successful strategy to reduce consumption averages (Kenyon and Barker, 1998; Reay et al. 2011: 590). National Danish statistics do show a slight decrease

in meat consumption on average, but official health warnings about excessive meat consumption are often met with a correspondingly intense level of emotional and tradition-based support of the heavy meat diet. Although the link between excessive meat consumption and certain health and resource issues is often discussed in the Danish media, a well-anchored adherence to the traditionally heavy meat diet is evident in provincial areas and among social groups with lower education (Christensen et al. 2013; Micheelsen et al. 2013).

Any strategy for changes in Denmark must eventually find an angle of voluntary cooperation among members of the populace; one must be able to *play the Danish way*. Denmark is noted for its 'dogma' projects, initially in the film branch and more recently with New Nordic Cuisine in the gastronomy scene (Kingsley, 2012), and urban populations generally show public support of a meat-reduced diet. As a more playful part of our exploration, we designed our first study to utilize a similar self-challenge and 'point of honor' commitment to a personal dogma; 'The Meat Dogma Project'. We began by asking our colleagues if they would be willing to live by the meat-reductions recommendations arising in our research. Seven agreed to the self-challenge, and we joined them as participants.

For our second study, we chose to replace the self-challenge with a small but involuntary meat-reduction in the weekly luncheon menu for a large group of young children. In cooperation with parents and staff members, we conducted this study at a daycare institution with over 100 pre-school children in Horsens, a provincial area, in the eastern part of Jutland, Denmark. This article analyzes data from the two studies, followed by a discussion of future possibilities in meat mitigation practices.

Project Context

For our first study project (see Table 1), we invited an initial group of seven participants to join us in a self-designed dogma of reducing meat intake for a period of at least four weeks. We and the rest of the group completed a four-week period of eating less or no meat, and recorded the amounts of food and drink consumed for a daily and weekly total. Our participants were members of the DNMARK research project ("Danish Nitrogen Mitigation and Research Know-how': www.dnmark.org) or people associated with project members. The food consumption journal entries of all participants were made between May 2014 and January 2015.

The second study project (see Table 1), was conducted in cooperation with the daycare center Ta'Fat

Table 1. *Methodology model of exploratory and analytical research*

Research topic	**Methodology**	**Objective**
Qualitative analysis of participant entries for a small initial group of adult participants in 'The Meat Dogma Project'.	Written material from first dogma period divided into two categories: 1. Interactions with others, 2. Effects on the individual.	Increased dietary awareness and effective incentives for meat-reduction among Danish adults.
Qualitative analysis of application of dogma concept to a wide group of young children and staff at the daycare center Ta'Fat in Horsens, Denmark.	Analysis of dogma period, using staff meeting notes and field observations as material.	Effective strategies for modification of meat intake in Danish children's institutions.
Quantitative study of food N-Footprint; data of meat-consumption for participants in the first study.	Measurement and structuring of food N-Footprint for participant entries.	Increased awareness of individual diet and N-use balance.
Quantitative study of food data from daycare meals from before and during the dogma period.	Measurement and structuring of food N-Footprint for daycare meals at an institution.	Effective strategies for using data from institutions in the reduction of meat intake.

in Horsens, Denmark (http://tafat.dk/). The center normally makes lunches with two or three meat items each day, but agreed to a four-week dogma period – from September 2, 2015 to September 30, 2015 – of two meat-free days a week and three days with only one kind of meat. Because the group of participants in the second study consisted primarily of children under the age of six, we consulted with the pedagogues at the daycare center on their behalf while forming the conditions of the dogma period. The children's families were also contacted in order to ensure their acceptance of the changes in menu for the four-week period. Our final discussion entails recommendations aimed at reducing the current N-footprint by way of changes in consumer routine and individual awareness of dietary habits.

2. Methodology

We, the authors have combined our different academic disciplines of environmental science and philosophy in a transdisciplinary approach – both in our analysis and our fieldwork. The methodology of our project was designed to take both quantitative and qualitative factors into account.

First author Sandy Stiles Andersen used an ethnographical approach to the qualitative research. Ethnographic material for the first study came from the participant's journal entries and written correspondence with the participants, while meeting notes and field observations were used in the second study. The effects and impact for a small group of adults who used self-discipline to carry out a demanding dogma were qualitatively compared to the effects and impact for a larger group of children whose rutines were minimally and involuntarily changed.

Second author Morten Graversgaard quantified the participant's/institution's consumption patterns by calculating the foodprint part of the N-Footprint of the four week dogma period, along with a pre-baseline period to compare development in reduction or increase of the different dogma diets. This was done with the use of the N-Footprint Calculator (http://www.n-print.org).

The model of our methodology (Table 1.) is based on Julia Brannen's method for combining qualitative and quantitative approaches to research (Brannen, 2005: 177).

2.1 The Quantitative Foundation for our Research

The effects of imbalance in amounts of N in the environment have been well documented and we refer to those definitive studies, rather than present them in detail in this article (e.g. Bodirsky et al. 2014; Dalgaard et al. 2014; Sutton et al. 2013). One way to further understand the ramifications of the very complex relationship between meat production, consumption, N, and the environment is through the concept of *the environmental footprint*. The impact humans have on various aspects of the environment has been compared to the size of a symbolic footprint that we leave behind us as we travel through daily life. A definition of the ecological footprint of consumption is provided by Matthis Wackernagel, co-creater of the term and founder of the non-profit organizaton Global Footprint Network; *Advancing the Science of Sustainability*:

> *'The most commonly reported type of Ecological Footprint, it is defined as the area used to support a defined population's consumption. The consumption Footprint (in gha) includes the area needed to produce the materials consumed and the area needed to absorb the carbon dioxide emissions. The consumption Footprint of a nation is calculated in the National Footprint Accounts as a nation's primary production Footprint plus the Footprint of imports minus the Footprint of exports, and is thus, strictly speaking, a Footprint of apparent consumption. The national average of per capita Consumption Footprint is equal to a country's Consumption Footprint divided by its population'* (GFN, 2017).

The concept of the footprint has been applied to the effects of N through the development of the N-Footprint (Leach et al. 2012; Galloway et al. 2014). Awareness of the carbon 'footprint' has existed since the 1990s. While N-Footprint research is well publicized, publications pertaining to the impact of consumer behaviour on the environmental N-footprint are less common.

Meat is a very ineffective source of protein in environmental terms (Smil 2002). Various studies indicate that a lowering of protein consumption to recommended dietary levels[1], a decrease in food wastage, and changes in prioritizing of land areas from fodder production to vegetable production and grain for human consumption all show a decrease

in N-use, causing thereby a smaller environmental footprint (Shibata et al. 2017; Oenema et al. 2011; Steinfeld et al. 2010; Jarvis et al. 2011). A diminished consumption of meat would lead to a mitigation of N, and consequentially a smaller N-Footprint (Galloway et al. 2014). The 'foodprint' – calculation of food consumption and production – is a significant measuring tool in this discussion.

2.1.1 Calculation of N-Foodprint

The method of N-Footprint calculation was developed by the N-print project (www.n-print.org; Leach et al. 2012). The N-Footprint Calculator is a country-specific tool which allows individuals to measure the size of their N-Footprint (Leach et al. 2012). The calculation of an entire N-Footprint consists of food production and consumption data, energy data and housing and goods data (Leach et al. 2012). We have chosen to simplify the myriad of factors by focusing on the food factor of the N-Footprint (N-foodprint). We measure only individual diet, with a particular emphasis on the average amount of meat consumed.

2.1.2 Quantitative Methodology for the First Study

The Danish N-Footprint Calculator is in the process of development (Graversgaard et al. 2016). For this reason we have in the two study projects used German portion standards to make estimates of the N-footprint involved in the consumption process for each participant in our experiment. The standardized portion sizes are derived from collaboration with the research team of the N-Footprint project (http://www.n-print.org).

There are practical difficulties in assessing correct portion sizes. The use of the portion size when used by individuals can be subjective and hard to quantify and compare between participants. However even though we cannot be at all sure of accuracy in participant's measurements, we can suppose that if they error in portioning sizes in the baseline dogma, it will be the same error during their dogma period, so the difference is to a certain degree indicative. At the same time, the primary interest and purpose of the quantitative part of the paper is to create an awareness of dietary choices and the connection of these choices to N-Footprint and mitigation/meat reduction. We encouraged participants to record their daily diet in order to calculate their footprint. We were also hoping that this would increase their awareness of dietary habits.

In our first study, the nine participants were given up to eight weeks in which to write down all food and drink intake (four weeks of baseline/normal diet and four weeks of a dogma period) (see Table 2). The names of all participants were changed in order to ensure privacy. The participants recorded their food intake in different ways; some wrote down every time they ate or drank, while others finished the day with writing down their daily intake of foods (see Figure 1).

Week 1	Serving size (all that is eaten in a meal)	Volume [gr]	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total	Toatal volume [gr]
Poultry	with bones and skin	200							0,5	0,5	100
Pork	5 slices luncheon meat	200					1	0,25	1	2,25	450
Beef	5 slices luncheon meat	200	0,4		2			1		3,4	680
Fish/seafood		175								0	0
Milk, other dairy products		250	1,5	1,5	1,5	1,5	1	1,5		8,5	2125
Cheese	1 slice	30					3	1	1	5	150
Eggs	1	65								0	0
Wheat/other grains	1 slice bread	85	7	5	3	4	9	4	12	44	3740
Rice	cooked	225								0	0
Vegetables	2 handfuls	135	2		2	4	1	1	2	12	1620
Fruit	1	125	1,5	3	1	1		1	2	9,5	1187,5
Beans/legumes	1 can	160								0	0
Potatoes	1 large	225			1			1	1	3	675
Nuts	1 handful	60	2			1				3	180
Coffee/Tea	1 cup	10							2	2	20
Alcoholic drinks	1 glas	200								0	0

Figure 1. *Example of participant entries in the form of written notes of food and drink intake. Week 1 in the baseline period for Nicholas*

Table 2. Comparison of details for participants of the initial dogma project.

Participants	Baseline	Dogma	Period
Andrew L.	Yes, 1 week of recording baseline diet	No meat	1 week before and 4 weeks with dogma
Malene L.	No	No meat	Only 3 weeks with dogma
Jake J.	No	Only organic meat	4 weeks with dogma
Anne K.	Yes, 2 weeks of recording baseline diet	Only organic meat or fish	2 weeks before and 4 weeks with dogma
Linda S.	Yes, 2 weeks of recording baseline diet	Only organic meat	2 weeks before and 4 weeks with dogma
Betty B.	No	Only organic or free-range meat	4 weeks with dogma
Jacob M.	Yes, 6 weeks of recording baseline diet	Reduction of average use of N by at least five kilograms of N per year	6 weeks before and 4 weeks with dogma
Nicholas U.	Yes, 4 weeks of recording baseline diet	Reduction of weekly average meat consumption to maximum 800 grams[2].	4 weeks before and 4 weeks with dogma
Sofie I.	No	Reduction of number of meals with meat: meat only at suppertime.	4 weeks with dogma

All food intake was grouped into 16 food categories (poultry, pork, beef, fish and seafood, milk and other dairy products, cheese, eggs, wheat and other grains, rice, vegetables, fruit, beans and other legumes, potatoes, nuts, coffee and tea, alcoholic beverages) to be comparatively calculated in the N-Footprint Calculator. The results are given as an average Kg N per Year, if we assume they follow the weekly diet on an annual basis. This means that when we refer to kg N, we mean the N-foodprint of the diet.

As shown in Table 2, participants from the initial group chose the form of their individual dogma. They recorded their usual food consumption for a week or more before the agreed-upon dogma period, and then recorded food consumption while adhering to their dogma.

2.1.3 Quantitative Methodology for the Second Study

Our second study was made with a much larger group; roughly 100 children from the ages of one to six, and about 20 staff members. For this study we gathered weekly data (meals) four weeks before and four weeks during the dogma period. The data consists of information on the meals eaten by the children (morning, lunch and afternoon meals) (see Appendix I.). Although children eat much less than adults, and the study only encompassed 20 days of lunches and snacks (five weekly days for four weeks), the data shows all consumption in that period providing us with a greater total accuracy, which can then be calculated into averages.

Lunches for the second study were served as a collection of open-faced sandwiches (rugbrødsmadder), so although the children did not determine the daily menu, they did have a choice of which type of sandwich they would eat. The staff made sure that the children had access to all of the choices before choosing their own food. Meals in this study were also grouped into the 16 food categories, and calculated using the German standard N-Footprint Calculator.

2.2. Qualitative Research

The inclusion of quotes from journal entries as a research method has the potential dual role of functioning on an interpersonal and intrapersonal level. Sharing experience as a dramatic narrative has been shown by Arvind Singhal in his studies of edutainment (entertainment education) to be a highly influential form of dissemination (Singhal, 2013; Gesser-Edelsburg and Singhal, 2013).

We consider a public discussion of participant experiences to be one example of potentially engaging readers in a sympathetic reaction to the core concept of our project. When describing intrapersonal experiences, participants expressed a degree of personal change. In the process of reading about these changes, readers of this article could become interested in trying the same kind of dogma. A critical analysis of subjective entries in a scientific article can enhance an empathetic response from the reader, without losing academic credibility (Anderson, 2006).

2.2.1. Qualitative Methodology for the First Study

Our qualitative methodology for the first study was to use the meat dogma as an entertaining self-challenge for the participants. When we talked with each volunteer, we stressed the importance of keeping a journal during and after the dogma period. The task of keeping journal entries about their experiences involved participants more actively in the process of adhering to the dogma and observing the effect that the process had on them. The entries provided us with material for qualitative analysis. In order to ensure some form of written response, we also sent each participant a follow-up questionnaire (see Appendix II.).

Material from the journal entries and questionnaires involved either descriptions of impact on the individual or reactions of others to the individual. In order to map out our analysis of the first study, we divided our findings into two categories; interactions with others, and effects on the individual.

Interactions with Others

Participants had very different strategies for social navigating during their dogma period. Some felt that publicly complying with the meat dogma was an opportune avenue for introducing the issue, while others seemed unconcerned with reactions from colleagues and other acquaintances. One woman used her situation to excuse herself from any perceived social impropriety:

> '*The dogma will make it acceptable to refuse meat from people who invite me to dinner... make it more legitimate, rather than fanatical, and seem less impolite*' (Anne; only organic meat or fish).

The participant with the largest initial intake reduced his weekly meat intake to a little below average[2]. He wrote in a follow-up questionnaire that this reduction caused concern and discussion from other athletes, but did not affect him adversely:

> *'The negative was from other extreme sports people. They usually believe that more meat is necessary for the body. As I not have felt any difference in my sports performance I do not agree'* (Nicholas; weekly reduction to 800g, and later to 200-300g).

In their journal entries, participants often describe how they have taken the needs of their spouses and children into account when planning meals. The ability to uphold dogma stipulations did not seem to be affected by negative reactions from the participants' children, but there were several examples of 'cheating' - not following the dogma - when sharing a meal with their parents:

> *'My mother had spent days preparing this family feast; meatballs, roast pork with gravy, etc. I didn't have the heart to tell her that I wasn't eating meat for lunch. So I took a couple of small meatballs and managed to stay under the radar'* (Sofie; meat only for supper).

Participants who discussed these social hurdles wrote that they had no difficulty following their dogma when eating meals alone. If Danish individuals are to become more aware of their dietary norms, both the content and the context of shared meals are significant.

Effects on the Individual

Participants in our initial group noted that certain situations were very demanding for them. Several counted their largest hurdle to be having to refrain from a delicious meat dish without having any acceptable alternative:

> *'I settled for a mixed salat and some warm potatoes, staying away from the pork slices and steamy gravy,*

whose meaty fragrance wafted up to my hungry nose. This dogma is easier in some situations than in others!' (Linda; only organic meat)

Most of the participants developed strategies to deal with meaty tastes that they were used to and missed. Some of them kept a stock of umami-rich foods (such as sun-dried tomatoes, parmesan cheese, mushrooms, shitake, etc.) on hand and spent more on alternative supplemental items. The most unusual development toward the end of the dogma period was the concern of two participants that they had come to lack sustenance. They both felt 'hungry' at times when they had eaten enough food:

'I'm experiencing a kind of withdrawal and really long for meat. I've been compensating by eating more cake and candy, which is not so good' (Jacob; reduction of N-use with five Kg N annually).

The participants all reported a positive reaction to engaging in and completing a dogma that they had chosen as a challenge for themselves:

'... you immerse yourself in a radically different and yet realistic goal...if I had just chosen to eat less meat, it wouldn't have made such an impression on me' (Andrew; no meat).

All participants also described an increased awareness of individual lifestyle dietary choices and their ramifications:

'At first, I ate the whole dogma quota in the first two days. Now it has stabilized and I eat even less meat now than during my dogma period. And I go for a higher quality of meat than I used to' (Nicholas; weekly reduction to 800g, and later to 200-300g).

2.2.2. Qualitative Methodology for the Second Study

As mentioned earlier, lunches in the second study (five week days for four weeks) were served as a collection of open-faced sandwiches, so while the children did not determine the daily menu, they did have a choice of which type of sandwich they would eat. Since the parents pay for their childrens' lunches at the daycare center, the staff usually eat bag lunches brought from home. We agreed with the staff that pedagogues eating the food together with the children would have a normalizing effect for them, so the daycare center offered to pay for 'pedagogic lunches' during the dogma period. This enabled staff members who were sitting with the children to share the same foods, and to talk constructively with them about taste and preference. As mentioned earlier, the staff made sure that the children had access to all of the choices before taking their own food.

Under the project title; "Help the environment – cut down on meat!' (Skån miljøet – spar på kødet!), the center leader and her assistant began a communication with the parents through notices on the Ta'Fat webpage and facebook page. The Horsens Healthy Cities Network also cooperated in the public relations campaign by printing notices of the project on their webpage and facebook page. As part of our preperation for launching the dogma period, we used these communication avenues to invite the parents to a food tasting day, where samples of the intended meat alternatives were presented. The purpose of the taste samples day was to actively engage the families in the project. Members of the staff helped by creating cheerful, colorful posters for the event.

Most staff members were very supportive of the idea of introducing new vegetarian alternatives, one expressing the hope that the project would initiate discussions about meat intake levels: *'You want to contribute to making a change'*

Another felt that being involved in the project would affect her personal dietary habits positively: '*If I cut down on meat, a lot of those fattening sauces and other side dishes disappear as well'*

Reactions and results were recorded from fieldwork observations during the taste samples day, and from meetings and interviews with the staff during and after the dogma period.

Reactions of the Adults

The families who came to the taste samples day were interested in and supportive of the project. A few fathers remarked that the dishes were new to them and they were surprised by how good they tasted. As a form of entertainment, we arranged for a taste competition between a spaghetti dish with ground beef and the same dish with soyaprotein instead. Without knowing, which dish was vegetarian and which was with meat, tasters voted for the dish that they thought tasted best[3].

During the course of the dogma period, parents of the older children had no comments about the food. According to the meeting notes from the daycare center, parents of the youngest children were enthusiastic about the modified menues, saying that it was hard for them to make anything that interesting at home. The staff enjoyed the new dishes and agreed that the food was more innovative and the menu much improved.

Reactions of the Children

Although the children had not been involved in the forming of the project they did have reactions which provided us with material. Notes from a final meeting categorized comments from the pedagogues into the different age groups of the children. The youngest (1 ½ - 3 years) needed a longer time period than four weeks to accept the new dishes as a normal part of their diet. Many of them tried a taste now and then, but there was little consistency. The next group (3-4 years) were very observant of which foods the pedagogues chose, and many of them followed along with them. On days in which the children were invited to help make the meals, they were more willing to eat the more unfamiliar dishes. The two oldest groups (4-5 years and 6 years) made their own choices, but usually stuck with the foods with which they were familiar. During the dogma period, the older children did eat a lot more raw vegetables than usual. In general, the staff agreed that the older the children, the more conservative their eating habits.

3. Analysis

3.1. Analysis of the Qualitative Material

Certain food narratives played a role in each of our studies. 'Celery-fish' (selleri-fisk) is a good example of a food narrative which emerged during the project. Staff members at Ta'Fat told us that the fried and breaded sliced celeriac with lemon and remoulade was so popular, it was continued as a regular part of the post-dogma period menu. Because of its resemblance to fish fillet, the children began calling it celery-fish, giving it a narrative identity which has now become a part of their normal diet.

Narratives were often written in the journal entries of hurdles the participants in the first study faced in maintaining their dogma. While some felt challenged by their own hunger for meat, other participants were more disturbed by social situations in which friends or family expected to share a meal – and meat – together with them.

3.1.1. The Narrative of Commensality

The power of commensality must be taken into account when designing a project involving a self-appointed change in diet which does not fit into the normal routine. We are all affected by the sense of social bonding that comes of eating a meal together (Fischler, 2011), and when those sitting at the table together with us do not join in the meal, the narrative of the shared eating experience deviates from the norm. Participants in the first study were duty-bound to refuse to eat meat in certain social situations. When they at times found themselves in awkward social situations, they reacted by either attempting to disguise their abnormal behavior, explain the aspects of the project as an excuse, or present arguments to defend the point of the dogma. As we observed earlier, adults who felt very uncomfortable opholding a reduction of meat during a meal with their parents seemed to be less affected by negative reactions from their own children.

For the second study, adults in charge of children chose a change in diet on their behalf. Both parents and pedagogues were understandably concerned about the health and well-being of all children in their care, and the healthiness of increased vegetable intake was acknowledged as an acceptable incentive. Once the dietary change was accepted among the adults, there was no sense of social abnormality. During the preliminary meeting, all staff members agreed to refrain from making any negative comments about any of the dishes in front of the children, so their experience of the tastes would be positive, or at least neutral.

In order to further integrate the acceptance of the new foods on a social level, we initiated the change in diet with 'Taste Samples Friday', a celebratory event of eating together. During the taste samples day, staff members, parents, and children all tasted foods together in a ritual of commensality which helped to normalize the new dishes by rendering them more socially acceptable. As a further dramatic feature, we wouldn't allow the children to taste the samples before the parents arrived in the afternoon. The entire day, children loitered around the door of the kitchen smelling new scents from the kitchen

and asking to try a taste of each dish. Our insistence on holding the new experience away from them until the parents arrived created an extra layer of ceremony and expectation.

3.1.2. Health Narratives

Many food narratives are connected to health concerns. Pedagogues of the youngest children remarked that they ran through more diapers because of the extra vegetables during the dogma period. In the final meeting, two staff members also claimed that eating so many vegetables had given them an intestinal infection. This was by no means corroborated by a doctor, nor is there any evidence that eating uncontaminated vegetables causes intestinal disease. However, the narrative that vegetarianism causes diarrhea is now believed by these individuals.

Another narrative that is quite common in Denmark is the fear of not eating enough protein. During Ta'Fat's initial meeting, the presentation of a weekly menu with fish but no meat for two days caused the immediate reaction of concern from one staff member that the children would not get enough protein. Since all of the children presumably ate meat for supper and during weekends, since fish was still served at one or both of the two lunches, and since the vegetarian alternatives were also sources of protein, this concern was more a response triggered by a well-entrenched protein narrative, than a realistic evaluation of the situation.

Narratives such as these exemplify reactions to a change in traditional levels of meat consumption.

3.2. Analysis of the Quantitative Material

Reduction of N by way of a mitigation of meat consumption is by its nature a wide-ranging sustainability project, involving social norms and consumer research, as well as empirical data. The application of a quantitative methodology in mitigating meat diets by way of a dogma project has shown a positive relation between dogmas, mitigation of meat consumption and a general reduction in Kg N per individual per year, if continued.

3.2.1. Comparative N-Footprint Calculations of the Dogma Diet

Eight of the nine participants in the initial project noted their daily diet under their dogma and filled-out spreadsheets (see methodology section and Table 2.). As shown in Table 3, the dogma Kg N per year for the participants ranges between 14.3 and 24.2, with an average of 18.8 Kg N per person per year. This is slightly lower than the annual German average per capita, which is 19.6 Kg N (Galloway et al. 2014). In general, the males had a higher foodprint than the females; Jacob had the highest with 24.2 Kg N and Betty B. had the lowest with 14. 3 Kg N.

Five of the participants also completed more than one week of pre-dogma diet notation (Baseline of kg N per year consumption). We have compared

Table 3. *Dogma diets and Kg N per year.*

Particpant		**Dogma kg N per year**
Jacob M. (Reduction of yearly average use of N by at least five Kg)		24.2 Kg N
Nicholas U.	(Reduction of weekly average meat)	20.3 Kg N
Andrew L.	(No meat)	19 Kg N
Linda S.	(Only organic meat)	20.3 Kg N
Anne K.	(Only organic meat or fish)	16.8 Kg N
Malene L.	(No meat)	16 Kg N
Jake J.	(Only Organic meat)	19,5 Kg N
Betty B.	(Only organic or free-range meat)	14,3 Kg N
Average Dogma Kg N		18,8 Kg N

Table 4. *Kg N per year for the five participants; period before (baseline) and during the dogma period*

Particpant	**Baseline Kg N**	**Dogma kg N**	**Decrease or Increase**
Jacob M. (reduction of N-use five Kg)	30 Kg N	24.2 Kg N	Decrease 19,3 %
Nicholas U. (reduction to 800g)	24.8 Kg N	20.3 Kg N	Decrease 18,1 %
Andrew L. (no meat)	22 Kg N	19 Kg N	Decrease 13,6 %
Linda S. (only organic meat)	23 Kg N	20.3 Kg N	Decrease 11,7%
Anne K (only organic meat or fish)	15.5 Kg N	16.8 Kg N	Increase 8,4 %

the data for the five participants in the initial group who kept a record of consumption both before and during their dogma period (see Table 4.).

Four of the participants had a decrease in their N-Footprint (see Table 4) showing that the dogma has an effect. One of the participants had an increase in her N-Footprint (AnneK.). The reason for this is possibly coming from other aspects of her normal eating habits. Anne normally ate very little meat, bringing her baseline average of N-use below that of the other participants. Her normal diet consisted of a mix of organic and non-organic foods, and when it changed to only organic items during the dogma period, this may have caused an increase in N.

4. Discussion

In our calculations of the first study, we compared the pre-dogma periods with the dogma periods. Even when compensating for less meat by eating elevated levels of grains and dairy products, we found that there is a general reduction in Kg N, suggesting that a mitigated meat diet is a direct factor.

While participants chose their own dogma and agreed voluntarily to maintain it for four weeks, most of them found it to be a difficult challenge in various ways. All nine of the participants in the first study concluded that they experienced an increased awareness of their own dietary patterns and most were motivated to continue to eat less meat. In the follow-up questionnaire, they all indicated that the project had a positive outcome for them, and more than one claimed to be continuing with their dogma practice:

> *'Beyond the initial issues, it hasn't been that hard living up to my dogma. When I got into the rythm of making meals based on vegetables instead of thinking of meat as the centerpiece, it was easy enough. In the future our family will be eating less meat, more fish, and more beans and legumes'* (Malene; no meat).

> *'The dogma period has influenced me to eat less meat and more vegetables, by making more varied vegetable dishes'* (Betty; only organic or free-range meat).

One participant in particular suggested that enacting a dogma within this structure was much more effective than any individual mental resolve:

> **'***I have absolutely no doubt that the dogma concept has been influential. It's a really good way to structure a change in an otherwise habitual routine and behavioral pattern, because you immerse yourself in a radically different and yet realistic goal. The point is that it should be so different that it really feels different, and demands some real modifications. For example, if I had just chosen to eat less meat, it wouldn't have made such an impression on me. So I would say that it was a good lesson for me; if you want to change your habits, then one of the best tools is to establish a dogma about the habit that you want to change.'* (Andrew; no meat)

It must be argued, however, that only participants who accept the premise that it would be good for them to eat less meat would embark on a four-week dogma of meat-reduction. And only participants who are already motivated would be willing to carry it through. Our initial idea for this study was to explore the possibility of presenting the self-challenge

in a public forum that would motivate others to try the same thing. We did attempt to present the self-challenge – along with quotes from the journals – on a public webpage in the hopes of eliciting comments from readers, but found that the only reactions came from readers who already had a vegetarian or nearly vegetarian diet.

Our second study was in contrast a large group with minimal but involuntary dietary change. In the study from the daycare center, results from the four-week period prior to the dogma period (the two meat-free days a week, along with a general aim of reducing the number of daily meat choices) were compared with a pre-dogma period of four weeks. Preliminary results, estimating the institutional N-Footprint of the daycare center, suggest an average 20 % reduction in the institutional N-Foodprint with two meat-free days every week in the four week period. Results show a significant reduction in the N-Footprint, which provides a good baseline for further study on the effect of reducing meat intake in institutions for young children.

In our follow-up meeting with the daycare center after the dogma period was completed, the leaders told us that they had decided to have a meat-reduced menu plan permanently. Staff members had suggested a longer dogma period in order to give the children time to get used to alternatives in the menu, and continuing the modified menu plan will do just that. Since the parents pay for the lunch, their support of this decision demonstrated that they were willing to continue supporting a meat-reduced menu plan financially, making the dogma strategy with its associated practices of commensality a success. This has led us to propose that in situations involving institutional dietary changes with young children, a long-term incremental modification can eventually become the norm.

While it was not possible to record the actual consumption for each child at each meal in the second study, data of all daycare meals from the four week period has been gathered and compared to that of baseline data from the four weeks prior to the study. This will be used in a future study quantifying the institutional N-Footprint of the daycare center. Since the quantitative data from the dogma period shows a reduction in N-use, this factor can also function as an empirical incentive in future projects.

As data from this study provides a useful baseline; the next logical step will be to expand it to a larger sample size in a third study. We plan to introduce the same kind of meat-reduced luncheon menu in an institutional cantine for adults for four weeks. Recording baseline data and data from a dogma period at an adult institution will enable us to compare various aspects of the N-footprint.

Most of the adults conducting a dogma self-challenge felt that they had difficulty refraining from eating meat in some situations. In our third study, we will compare this data to the reactions of adults in an involuntary situation with a minimal reduction of access to meat. We intend to conduct surveys and interviews during the proposed dogma process and use a modified form of our follow-up questionnaire after the four-week dogma period.

5. Conclusion

Data from this meat dogma project indicates that a period of reduced meat consumption results in a decrease in N-Footprint at both the individual level and institutional level.

Adults who agree to a dogma of eating half as much meat as usual or no meat at all seem to be able to follow it for a period of at least four weeks, and possibly longer. Complying with a meat-reduced diet is however demanding and puts the individual in a difficult position during situations, wherein the sharing of meat is a symbol of sharing a social bond.

We have observed that dietary changes can meet with more support from the affected group if they are initiated with a popular ceremony of commensality, such as our samples tasting day for the children's families at the Ta'Fat daycare center. In situations where institutions are planning meals on behalf of large groups of individuals, we propose a more moderate change in diet over a longer period of time. Daycare centers constitute the first society for Danish individuals, and the societal meat-consumption narratives that they practice become a life-style norm for young children. New meat alternatives which become popular norms for children can both influence the dietary decisions of their parents, and go on to determine the norms of the children's own future families.

The strategies proposed in this paper could with broader implementation result in a more sustainable consumption as a norm.

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Notes

1 The stated health goal of the World Cancer Research Fund is 300 g per week, no more than 500 g of red meat per week, and little or no processed meat (Andersen et.al. 2013: 9; WCRF, 2017). Studies for various age groups and individual weight propose that adults ages 19-70 require 0.7 to 0.8 g. of protein per kg. weight, while younger and older ages have a slightly higher protein intake: however, the recommendation is that a primarily plant-based protein is prefereable for health. (Levine et al. 2014: 414).

2 The original weekly amount of meat for this participant was 1 ½ - 2 Kg., so although 800 g for his dogma period is higher than the standard recommended amount of 300 g of meat weekly, it is half as much as he usually ate. He has since reduced his weekly meat intake to an average of 200-300 g.

3 The vegetarian spaghetti actually won, 22-17.

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Appendix I.

Example of a weekly menu at the Daycare center before the dogma period.

Menu Ta'Fat
Monday:
Morning:
Whole wheat bread and fresh fruit
Lunch: open-faced sandwiches
Liverwurst w/cucumber, cheese w/gr pepper, cooked vegetables.
Hummus, cheese w/gr. peppers, cooked vegetables
Afternoon:
Carrot rolls and fresh fruit.
Tuesday
Morning:
Cranberry rolls and fresh fruit
Lunch:
Ham (pork saddle) w/potatoes, aspargus sauce and cooked carrots.
Afternoon:
Ryebread and fresh fruit
Wednesday:
Morning:
Whole wheat bread and fresh fruit
Lunch: open-faced sandwiches
Ham and cheese, chicken and bacon
Tossed salad w/ tomatoes, cucumbers and dressing
Afternoon:
Whole wheat bread and fresh fruit
Thursday:
Morning:
Carrot rolls and fresh fruit
Lunch:
Greek meatballs w/ creamed potatoes and broccoli
Afternoon:
Ryebread slices and fresh fruit

Friday:
Morning:
Whole wheat crackers and fresh fruit
Lunch: open-faced sandwiches
Mackerel in tomatoe, chicken sausage w/cucumber, ham w/Italian salad
Liverwurst w/cucumber, cheese w/gr. peppers, cooked vegetables
Afternoon:
Whole wheat bread and fresh fruit

Appendix II.

We are sending a questionnaire out to people who have completed their 4-week dogma to see if there are any common experiences and reactions.

Since this questionnaire is a word document, please just write your answers after each question and send it back. If you have already written about any of these items in your blog, just skip them, but we would really appreciate any new information that these questions could lead to about your dogma period. If there is something you don't want me to quote anonymously, please mark the area and let us know.

Name
(We will change your name in my quotes to keep your information private)

How much meat do you normally eat a week (it can be just a rough estimate)?

What is your dogma specifically?

What was/were your reason/s for doing this 4-week dogma?

Has it been a big change for you to maintain this diet? If not, what is the reason that it hasn't been so different from your usual dietary lifestyle?

If so, what kind of physical and/or psychological affect have you experienced?

Have you been any more hungry than usual? If so, when during the day, what kind of hunger, how soon in the 4-week period has it occurred?

How did it make you feel, and what did you do about it?

Have you eaten more of another kind of food during your 4-week period?

Have you been forced to make new or more difficult decisions about what to eat at certain times? If so, would you describe the situation(s)?

Have you been in a social position of having to explain about your 4-week dogma? Have you done things to avoid coming in this position? If so, would you describe the situation?

Have you purposely brought up the subject to some people? If so, what is your relation to them, and what was your reason for bringing it up?

Have you met with positive and/or supportive reactions from people who heard about your dogma? Or, have you met with negative and/or critical reactions? If so, would you describe these situations?

A certain period has now passed since you completed the dogma period. Do you feel any change in your way of making choices about what you eat and when? If so, what are they?

Have you experienced any physical changes that are clearly from the change in diet during the 4-week period? If so, would you describe them?

Do you consider the process of going through the dogma period to have been useful to you? In what way?

Do you have any plans for continuing this dogma or trying a period with another kind of dogma, and if so, what would it be?

What do you think are the environmental impacts of eating meat?

Thank you so much for your time and willingness to be a part of this study. We appreciate it.